

The Effect of Soluble Fibre (Plantago OVata Husk) in Dyslipidemic Type 2 Diabetic Patients

Thesis

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By

Bashayer Abdulmohsen Mohamad Al Musabahi

*Bachelor Degree of Medicine and Surgery
Faculty of Medicine-Kuwait University*

Under Supervision Of

Prof. Dr. Mohamad Hesham El Gayar

*Professor of Internal Medicine and Endocrinology
Faculty of Medicine – Ain Shams University*

Prof. Dr. Mohamad Ahmad Shaaban

*Professor of Internal Medicine-Almonofyah University
Head of Medical Department on Jaber Alahmad Hospital
for Milletary Forces of Kuwait*

Dr. Inas Mohamed Sabry

*Assistant Professor of Internal Medicine and Endocrinology
Faculty of Medicine – Ain Shams University*

**Faculty of Medicine
Ain Shams University**



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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قَالَ

سَبِّحْكَ لَا إِلَهَ إِلَّا مَا عَلَّمْتَنَا إِنَّكَ أَنْتَ
الْعَلِيمُ الْعَظِيمُ

صدق الله العظيم

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List of abbreviations

Apo-A	Apolipoprotein A
Apo-B	Apolipoprotein B
BMI	Body Mass Index
CETP	Cholesteryl Ester Transfer Protein
CHD	Coronary Heart Disease
CV	Cardiovascular disease
DF	Dietary Fiber
FA	Fatty Acid
FBG	Fasting Blood Glucose
FBI	Fasting Blood Insulin
GIP	Glucosedependent Insulinotropic Peptide
GLUT-4	Glucose Transporter Type 4
HDL	High Density Lipoprotein
LDL	Low Density Lipoprotein
MI	Myocardial Infarction
NCEP	National Cholesterol Education Programe
NHANES	National Health And Nutrition Education Study
PAD	Peripheral Arterial Disease
PPAR	Peroxisome Proliferator- Activated Receptor
PPBG	Post Prandial Blood Glucose
PPI	Post Prandial Insulin
RR	Relative Risk reduction
T2DM	Type 2 Diabetes Mellitus
TG	Triglyceride

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Introduction

Psyllium, also referred to as ispaghula, is derived from the husks of the seeds of *Plantago ovata*. Psyllium contains a high level of soluble dietary fiber, and is the chief ingredient in many commonly used bulk laxatives, including products such as Metamucil® and Serutan® **(Rockville, and Bethesda, 2010).**

Psyllium has been studied as a "non-systemic" cholesterol-lowering agent, with generally modest effects seen on total cholesterol and low-density lipoprotein levels. Several psyllium-containing cereals such as Heartwise® and Bran Buds® have been touted for their potential lipid-lowering and "heart health promoting" effects **(Rockville and Bethesda, 2010).**

Po-husk, apart from lowering LDL-C, also has been shown that it reduced TG, TG related to certain gene variants, TC, Apo B-100, oxLDL, insulin-resistance and systolic BP in mild-moderate hypercholesterolaemic individuals **(Sola et al., 2010).**

The soluble fiber found in psyllium husks plays an important role in lowering cholesterol. Psyllium also softens stool and relieves constipation, irritable bowel syndrome, hemorrhoids, and other intestinal problems. When psyllium

husk comes in contact with water, it swells and forms a gelatinous mass that stimulates the transport of waste through the intestinal tract. Soluble fibers such as those in psyllium husk, and oat bran have a cholesterol-lowering effect when added to a low-fat, low-cholesterol diet. Studies have shown psyllium to be quite effective in lowering total as well as LDL ("bad") cholesterol levels, which can be helpful to those with high cholesterol (hypercholesterolemia) and those at increased risk for developing hypercholesterolemia, such as people with type 2 diabetes **(MDidea, 2010)**.

Studies suggest that a high-fiber diet, which may include psyllium, can lower insulin and blood sugar levels and improve cholesterol and triglyceride levels in people with diabetes. This type of diet may also help prevent diabetes in those at risk for the condition, also psyllium may enhance the sensation of fullness and reduce hunger cravings. For these reasons, incorporating psyllium and other sources of fiber into the diet may aid weight loss and may help lower blood pressure **(MDidea, 2010)**.

Aim of the Study

Study the effect of Soluble fibre (Plantago ovata husk) on lipid profile and glycemic control in recently diagnosed type 2 diabetic and dyslipidemic patients with no cardiovascular and other risk factors, and they are drug naieve.

Soluble Fibre (Plantago Ovata Husk)

History:

The genus *Plantago* contains over 200 species. *P. ovata* and *P. psyllium* are produced commercially in several European countries, the former Soviet Union and India. Plantago seed, known commercially as black, French, or Spanish psyllium, is obtained from *P. psyllium* L., also known as *P. arenaria*. Seed produced from *P. ovata* is known in trading circles as white or blonde psyllium, Indian plantago, or Isabgol. Isabgol, (or Ispaghul in Pakistan) the common name in India for *P. ovata*, comes from the Sanskrit words *asp* and *ghol*, meaning "horse flower," which is descriptive of the shape of the seed. India dominates the world market in the production and export of psyllium. Psyllium research and field trials in the U.S. have been conducted mainly in Arizona and Washington state (Sola., et al., 2004).



Description:

Although true psyllium comes from the plant *Plantago psyllium*, the husk and seed of *Plantago ovata* (Plantaginaceae) is commonly referred to as psyllium. Psyllium is widely used as a fiber supplement for the treatment of constipation. Psyllium husk is obtained by milling the seed of *P. ovata* to remove the hulls. In some studies the seed has been used instead of the husk, and is also commercially available (**Anderson et al., 2010**).

Active Constituents:

Psyllium husk contains a high proportion of hemicellulose, composed of a xylan backbone linked with arabinose, rhamnose, and galacturonic acid units (arabinoxylans). The seed consists of 35-percent soluble and 65-percent insoluble polysaccharides (cellulose, hemicellulose, and lignin). Psyllium is classified as a mucilaginous fiber due to its powerful ability to form a gel in water. This ability comes from its role as the endosperm of the *P. ovata* seed, where it functions to retain water in order to prevent the seed from drying out (**Bhagat, 2009**).

Mechanisms of Action:

Many studies have shown dietary fiber shortens gastrointestinal transit time and increases stool weight. When

given to healthy volunteers, 18 grams daily of psyllium husk increased fecal weight and the production of short chain fatty acids. Most of the psyllium was shown to reach the cecum four hours after ingestion in an intact and highly polymerized form. The husk appears to be relatively resistant to fermentation **(Anderson et al., 2000)**.

Psyllium husks also significantly increase the level of stool moisture, as well as wet and dry stool weight. Anaerobic fermentation of the soluble non-starch polysaccharides from psyllium seed results in the production of the short-chain fatty acids acetate, propionate, and butyrate in the intestines. Psyllium husk contains only the epidermis of the seed, while the actual seed has a higher amount of fermentable fiber **(Vega-Lopez et al., 2001)**.

Because of this fiber content, psyllium seed degrades more slowly than pectin and produces fairly large amounts of butyrate and acetate. Butyric acid exhibits antineoplastic activity against colorectal cancer, is the preferred oxidative substrate for colonocytes, and may be helpful in the treatment of ulcerative colitis **(Garcia et al., 2000)**.

In a study of resected colorectal cancer patients, those given 20 grams of psyllium seed daily for three months exhibited an average increase of butyric acid production of 42