

## EFFECT OF *PRUNUS AMYGDALUS* SEEDS ON LIPID PROFILE

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(Received on February 15, 1997)

**Abstract :** The effect of *Prunus amygdalus*, which is rich in unsaturated fat, fibre diet and low cholesterol was studied in 36 normolipidemic male albino rabbits for 60 days. Three different doses i.e. whole seeds defatted and oil showed a decrease in serum total cholesterol, triglyceride, LDL cholesterol, VLDL cholesterol and an increase in phospholipid, faecal sterol and HDL cholesterol. The maximum effects were shown by whole seeds followed by oil and defatted.

**Key words :** *Prunus amygdalus*

lipid profile

### INTRODUCTION

The Almond and its oil have been considered an important part of indigenous medicinal system (1). A number of earlier workers have reported its use as a laxative, an aphrodisiac, and for curing headache, biliousness iradication of dandruff and prevention of burning sensation from use of some medicinal products. It has also been claimed for providing relief from insomnia, enhancing mental retention power and as an excellent bone developer (2-4).

The average reported values of the almonds' content, as determined by estimation from 14 varieties cultivated on the island of Mallorca & Spain, are, water 5.39%, Fat 53.68% Cellulose 6.56%, Nitrogenous matter 24.18%, Non-nitrogenous extractives 7.23% and Ash 2.96% (5).

Subrahmanyam and Achaya (6)

almond oil to be approximately as Myristic 1%, Palmitic 0.5%, Oleic 77% and Linoleic 17%. The oil has been reported to consist principally of dioleins and trioleins in the proportions of myristo-dioleins 5.2%, palmito-diolein 14%, lino leo-diolein 52% and triolein 13% (6).

The alpha and gamma-tocopherol contents of almond seeds have also been determined spectrophotometrically on chromatographic fractions by Lambertsen et al (7), who reported the average values as  $\alpha$  tocopherol 150  $\mu$ g/g and  $\beta$ -tocopherol 5  $\mu$ g/g.

The volatile contents of bitter almond oil such as benzaldehyde and methyl salicylate have been used as insecticides. The consumption of bitter almond oil has also been reported to cause cyanide poisoning because of conversion of its amygdalin to hydrocyanide (8).

Kuppuswamy et al (9) have reported globulin and amandin as the chief proteins

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of almonds (N content 19 percent). The amino acid contents of amandin are arginine 11.9%, histidine 1.6%, lysine 0.7%, phenyl alanine 2.5%, Leucine 1.6%, Valine 0.2%, tryptophan 1.4%, Methionine 0.7% and Cysteine 0.8%.

Toxicity studies conducted by Qureshi et al. (10) on *Prunus amygdalus* seeds, used as aphrodisiac in Arab Medicine reported no toxicity by use in 24 hrs. Experimental studies were conducted on rats which were fed seeds for 3 months, and external morphological changes, visceral toxicity, hematological changes, average body wt., vital organ weight, sperm contents, sperm motility and sperm abnormalities were recorded. The average body weight increase was significant: haematological studies revealed reduction in WBC level: while the visceral condition remained normal and the percent lethality was insignificant, as compared with the controls. The plant extracts significantly increased the sperm motility and sperm contents in epididymis and vas deferens without producing any spermatotoxic effect.

The seed coat of almond (PA Batsch) contains upto 30% procyanidins with different degrees of polymerization and in addition, fatty oils, lignin, polysaccharides and cutin. The bulk material being large polymer, which is crucial to the structure and attributes of the seed coat (11) is only soluble by thiolysis, by thioglycolic acid. Kleeberg and Steiner (12) reported that sweet almonds are of value in the diets for peptic ulcer owing to the absence of serotonin.

Patients with advanced stages of cancer, given amygdalin orally at a dose of 0.5 g

three times daily, develop significant increase in the blood cyanide level. A large intake of raw almonds produces transient symptoms of cyanide toxic reaction with escalating blood cyanide levels (13). Indian women fed with Almonds had a marked inhibitory effect on iron absorption, as compared with those given cereals, legumes and soya proteins (14), which is due to the presence of polyphenols, phytate and proteins in almond seeds.

## METHODS

Male albino rabbits weighing  $1.572 \pm 0.100$  kg were divided into four groups of eight each. All the rabbits were acclimatized under laboratory conditions for one month and were maintained on Hindustan Gold Mohr (HGM) rabbit feed.

First group of rabbits given only HGM feed were used as controls. Second group rabbits were each given 2.50 g of whole crushed seeds per day along with the control diet. Third groups of rabbits were daily given 1.22 g defatted seeds, while the fourth group of rabbits were given 1.28 g of oil of the seeds per day. (Recovery of oil from seeds was 51.20%, and the oil and defatted dose weight were calculated accordingly). The defatted dose was given along with control diet, whereas the oil was poured into their mouth with a dropper in addition to control diet. For the preparation of the defatted almond powder and extraction of oil, 100 g of almond seeds were crushed to coarse state and to this 450 ml of anesthetic ether of IP grade was added. The contents were shifted to an air tight conical flask and it was kept on a shaker approximately

for 72 hrs for oil extraction from almond seeds. The ether of the supernatant part was evaporated and oil was decanted out from the beaker. The residual cake was dried in incubator at 60–70°C and used as defatted almond powder. The defatted portion was approximately 48.80% i.e. 1.22 g. Fasting blood samples from each rabbit were drawn from the central ear vein and 24 hr faecal pellets were collected fortnightly, and the studies conducted for two months. The pellets were weighed, powdered and preserved. Blood serum was analyzed for Triglyceride (12), Phospholipid (16), Total Cholesterol (17) HDL Cholesterol (18), LDL cholesterol, VLDL Cholesterol (19) and powdered faecal material for total faecal sterols (20). The data were statistically analyzed by applying paired sample 't' test (22).

RESULTS

The rabbits fed with the three different preparation of almond seeds showed a progressive and significant reduction in serum total cholesterol, triglycerides, LDL-cholesterol, VLDL-cholesterol, with increase in phospholipid and HDL cholesterol, as compared with control animals. Total faecal sterols were also increased in the experimental animals. Average values for these are shown in Figs. 1 to 7.

It can be seen that the use of whole seeds of *prunus amygdalus* produced more marked effects. Use of oil seeds alone produced a less marked effect, while the effect resulting from the use of defatted seeds was the least.

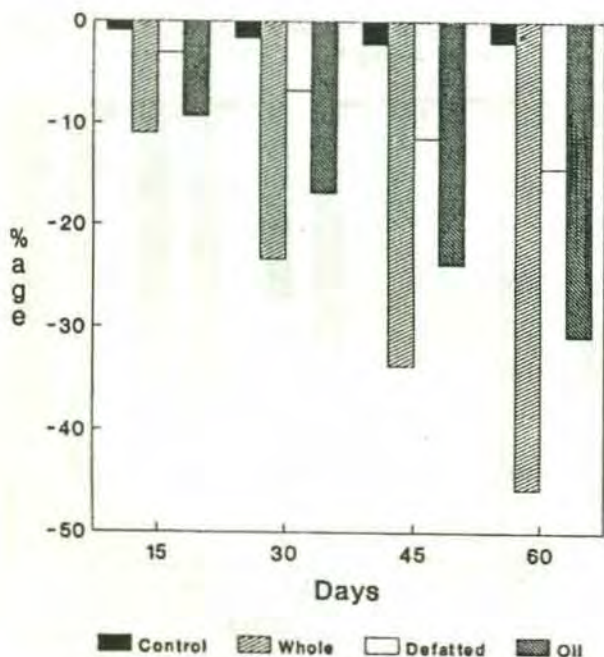


Fig. 1 : % reduction in serum triglyceride level after administering *P. Amygdalus* seeds.

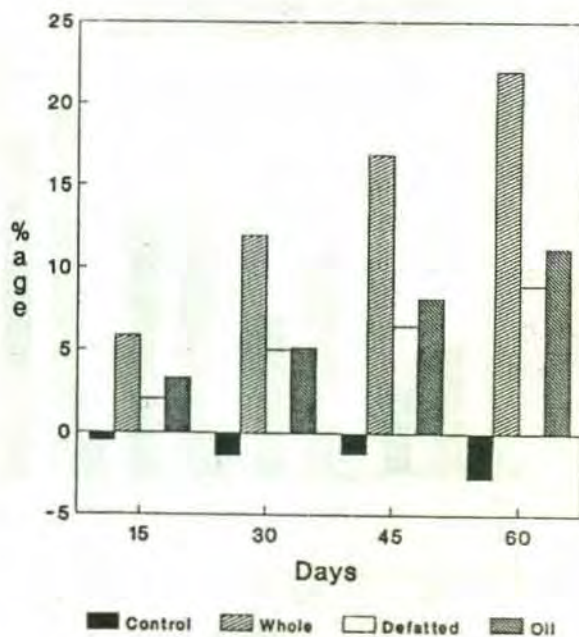


Fig. 2 : % increase in serum phospholipid after administering *P. Amygdalus* seeds.

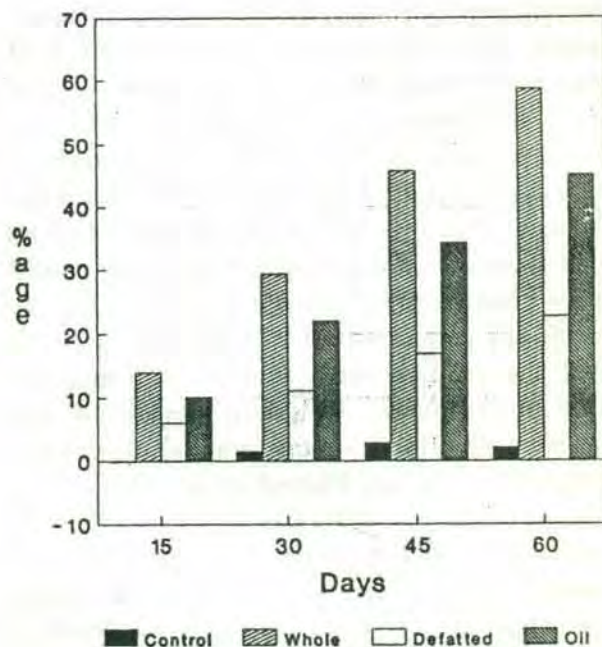
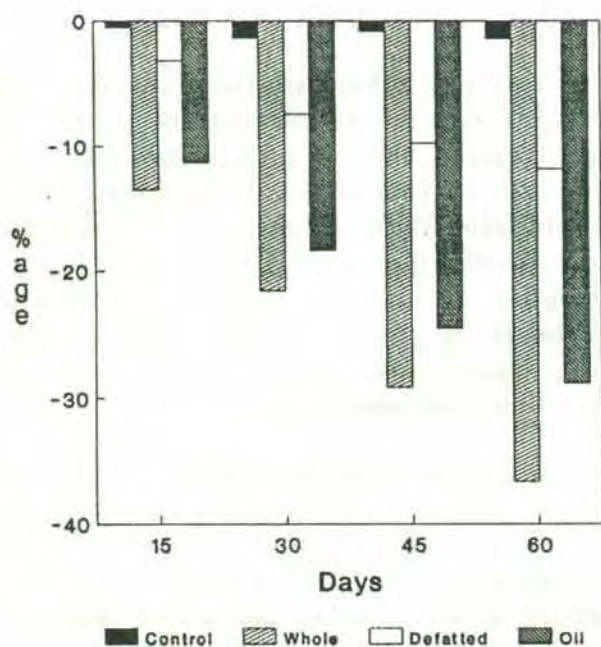


Fig. 3 : % reduction in serum total cholesterol after administering P. Amygdalus seeds.

Fig. 4 : % increase in total 24 hr faecal sterol after administering P. Amygdalus seeds.

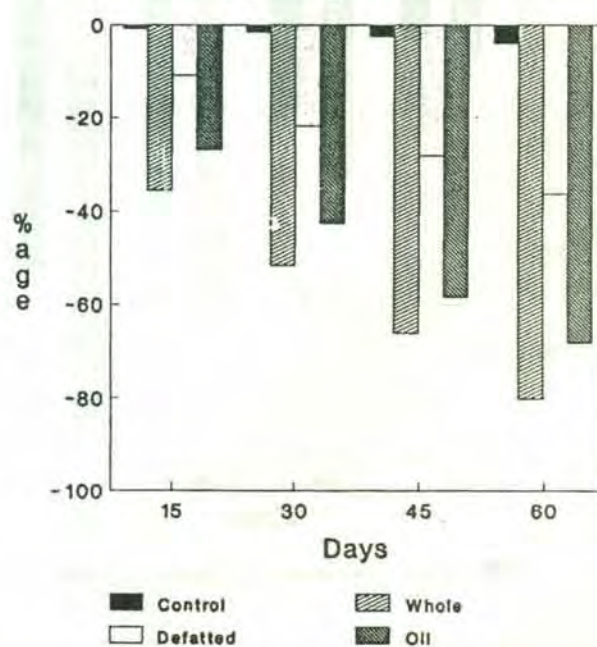
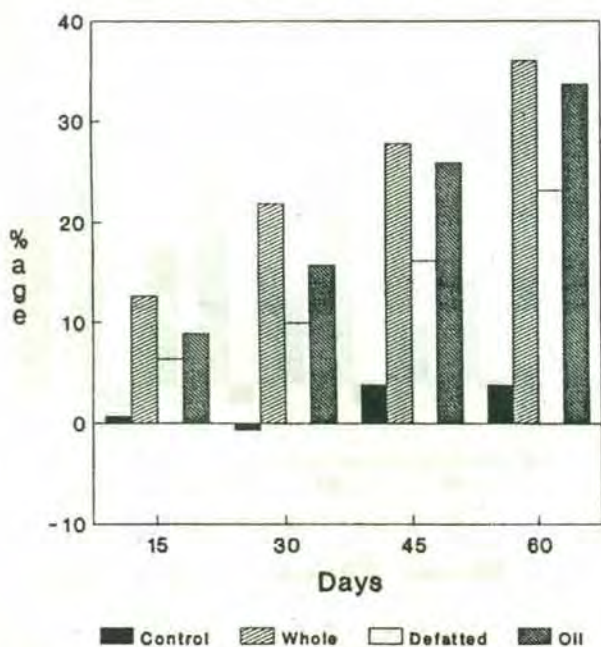


Fig. 5 : % increase in serum HDL cholesterol level after administering P. Amygdalus seeds.

Fig. 6 : % reduction in serum LDL cholesterol after administering P. Amygdalus seeds.

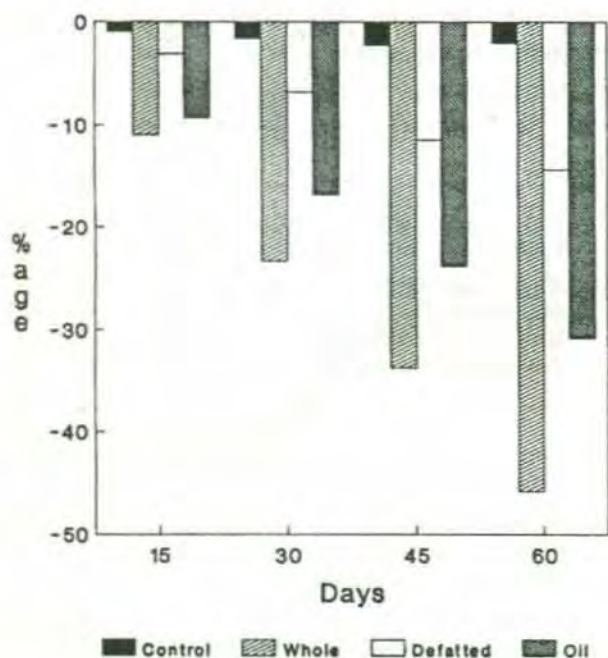


Fig. 7 : % reduction in serum VLDL cholesterol after administering *P. Amygdalus* seeds.

## DISCUSSION

Reduction in serum triglycerides, total cholesterol, LDL & VLDL cholesterol associated with rise in serum phospholipid and HDL cholesterol is a remarkable change brought about by almond seeds, which is considered to be extremely beneficial for protection against any atherogenic development. Increase in faecal excretion of sterol after almond administration associated with fall in circulatory cholesterol is suggestive of increased hepato-enteric excretion of cholesterol. Fall in LDL fraction of cholesterol suggests that almonds may be reducing cholesterol deposition in peripheral tissues, including blood vessels. Rise in HDL fraction of cholesterol is an indication of the fact that cholesterol

scavenging action from the sites of deposition in the peripheral tissue is increased after administration of almond seeds. Reduction in VLDL, which is a precursor of LDL, further indicates that the rate of formation of LDL, which deposits cholesterol in tissues, is brought down by almonds.

Serum cholesterol is inversely proportional to polyunsaturated fatty acids of the dietary fats/oils (23-26). Polyunsaturated acids also increase faecal bile acid excretion by producing more cholesterol esters which can be easily metabolized, whereas cholesterol esters produced by saturated fatty acids are not metabolized so easily (27).

It has been reported in normolipidemic male volunteers that saturated fats, when replaced by mono saturated and later by polyunsaturated fatty acids rich almonds, produce a significant reduction in total and LDL cholesterol respectively (28).

There is inverse relationship between HDL-cholesterol and coronary heart disease (29, 30), HDL is an important lipoprotein for the transport of cholesterol from tissues to liver (31).

Dietary protein and fat independently affect the levels of serum cholesterol (32). Thus almonds rich in dietary protein have significant effect on serum cholesterol levels and this may also be a factor in producing lower levels of serum cholesterol.

Decrease in blood cholesterol may be due to the lysine/arginine ratio present in almonds, the ratio being low because of abundance of arginine in it (33). This

nutrient compositions of almonds (fatty acid profile, fibre content and high magnesium density) (34) suggests its favourable affects

on risk factors for heart disease by interfering with the process of atherogenesis.

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