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REVIEW ARTICLE

Uric Acid Lowering Effects of Psyllium Seeds on a Hyperuricemic Patient: A Case Report and Review of Literature

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Abstract

Background: Psyllium seeds, produced from *Plantago ovata* Forsk, are an herbal treatment generally used as a laxative. They also reportedly have lowering effects on some metabolic parameters such as blood glucose, lipids and uric acid. In this paper, we report the effect of this herbal medicine in reducing serum uric acid levels, without major adverse effects, in a hyperuricemic patient.
Case report: A 51-year-old patient with a history of hyperuricemia (10.5 mg/dL in a recent measurement) gave consent to undergo a 40-day treatment using psyllium seeds with dosage of 83.3 mg/kg. Treatment was given in two 20-day courses: During the first course, the seeds were given daily and during the second course, the same dosage was given every other day. Serum uric acid levels decreased to 8.1 mg/dL and 6.8 mg/dL on the 20th and 40th days, respectively. No major adverse effects were observed, such as skin rashes, digestive disorders, muscular pain, allergic manifestations, abnormalities in liver and kidney function tests, and abnormalities in blood parameters.
Conclusion: Psyllium seeds may be effective in reducing serum uric acid levels in hyperuricemia patients, and major adverse effects are not expected to occur. These data can be used for further research and designing clinical trials.

Keywords: Hyperuricemia; Psyllium; Uric Acid; Xanthine Oxidase

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INTRODUCTION

Uric acid is the final product of purine catabolism, and xanthine oxidase has an important role in its production. The increase of this important metabolite in serum levels is associated with many health consequences such as gout, hypertension, cardiovascular and kidney diseases (1). Hyperuricemia, which is diagnosed by an abnormal increase in serum levels of uric acid, is an important risk factor for gout and oxidative stress disorders. Hyperuricemia develops as a result of disturbances in the pathway of purine metabolism. Therefore, the most important therapeutic measure is to control uric acid production (1, 2).

The conventional medicines for hyperuricemia and many other chronic diseases are sometimes associated with long term side effects. Due to this, there has been an exploration for medicinal plants with potential therapeutic benefits and lack of major side effects (3-7). Psyllium is a medicinal plant which belongs to the Plantaginaceae family. It is used in traditional medicine for treating skin injuries, gastric disturbances, and inflammatory ureterorenal diseases (8). Two species of *Plantago psyllium* and *Plantago ovata* Forsk in Iran are called as "Esparzeh" in the Persian language (9). Anti-hyperglycemic and anti-hyperlipidemic effects of this plant have been ascertained in experimental and clinical studies (10, 11). Plants in the Plantaginaceae also have strong antioxidant and anti-inflammatory properties, due to the high content of phenolic compounds (12).

Psyllium products also have a high fiber content, which may help absorb uric acid in the bloodstream and facilitate its elimination through the kidneys (13). These features would be of interest for patients with hyperuricemia. Here, we report the solitary use of this product in a hyperuricemic patient, with promising outcomes and lack of any major adverse effects.

CASE PRESENTATION

A 51-year-old man with a three year history of hyperuricemia (recent measurement of > 10.5 mg/dL serum uric acid level) and no other significant health problems gave written informed consent, in accordance with the ethical principles of Helsinki declarations for human studies (14), to undergo a specific treatment plan. The patient's past medical history showed use of the anti-gout drug Allopurinol for a couple of years and use of anti-hyperlipidemic drugs, namely Gemfibrozil. The patient was not using any medication when

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this protocol was initiated.

Treatment protocol& laboratory assays

Psyllium seeds were purchased from a valid herbal shop. The amount of psyllium used for this treatment was based on traditional medicine and scientific papers (15). Treatment with psyllium was done in 2 courses. The first course of treatment lasted for 20 days and included daily intake of 5g psyllium seeds in 150 ml of water (3.33 g/dL equivalent to 83.3 mg psyllium per kg of body weight). During the second course, also lasting 20 days, the drug was continued with the same dosage but was taken every other day. No other drug was taken during this 40 day period.

Before treatment, serum uric acid levels and some other blood parameters were measured in a fasting state using a calorimetric assay kit (Pars Azmoon Co., Tehran, Iran). Experiments were carried out in the department of pathobiology laboratory in Farabi hospital in Tehran, Iran.

Therapeutic response and adverse effects

As mentioned, the serum uric acid level was 10.5 mg/dL before starting the treatment plan. The serum uric acid level was 8.1 mg/dL and 6.8 mg/dL 20 days and 40 days after treatment was initiated, respectively. Following the treatment, no remarkable adverse effects were noted, including skin rashes, digestive disorders, muscular pain, allergic manifestations, abnormalities in liver and kidney function tests, and abnormalities in blood parameters (Table 1).

DISCUSSION

Psyllium seeds are generally made from *Plantago ovata* husks. They have important medicinal uses and are high in fiber content (>70% fiber). Fiber-rich plant-based foods have lowering effects on serum levels of glucose, lipids and uric acid. They either bind to food and prevent their complete digestion in the intestinal lumen, or adsorb metabolites in the blood circulation, which facilitates their excretion (13, 16-18). In this paper, we reported that the use of a psyllium product for 40 days in a patient with hyperuricemia resulted in a 3.7 unit decrease in serum uric acid level.

Psyllium seeds and their supplements are also rich in flavonoids. Flavonoids with a phenolic structure have several hydroxyl (OH) groups, which are able to neutralize oxygen free radicals and prevent oxidative damage *in vitro* and *in vivo* (19-21). Flavonoids are shown to have protective effects against cardiovascular diseases and cancer, attributable to their antioxidant properties and inhibition of certain enzymes including xanthine oxidase (22). Due to their structural similarity to the substrates of xanthine oxidase, they can attach to the active site of the enzyme and inhibit its activity (23). Accordingly, the flavonoid compounds in the psyllium plant, such as luteolin, can inhibit the xanthine oxidase either in the pathway of hypoxanthine to xanthine conversion, or the pathway of xanthine to uric acid conversion. This leads to effectively reducing the level of uric acid in the blood (Figure 1).

Our previous study showed that a psyllium supplement along with a specific dose of allopurinol were able to synergistically inhibit xanthine oxidase, thus reducing the serum uric acid levels in a patient with hyperuricemia (18). In the present report, we showed that solitary use of this product is also useful and has uric acid reducing effects. This reduction is of importance, as it could maintain uric acid at normal levels. Moreover, the use of psyllium seeds with the mentioned dosage was not associated with major adverse effects. On the other hand, allopurinol, the standard of care for hyperuricemia, may cause allergic reactions, skin rashes, and kidney and liver function abnormalities (24). In addition, xanthine oxidase inhibitors are reported to result in side effects such as increased plasma concentrations of pyrazinoic acid, hypocalcemia, metabolic acidosis, and digestive disorders (25-27). Hence, psyllium seeds might be favorable alternatives to these treatments.

CONCLUSION

Psyllium may be effective in reducing serum levels of uric acid in hyperuricemia patients, and their use lacks major adverse effects. Considering this evidence, further experimental studies and a phase I clinical study can be

Table 1. Laboratory studies before and after the treatment in the patient

Lab tests		Time points	
Parameter	Normal range	Before treatment	40-days after treatment
Uric acid mg/dL	3.6-8.2	10.5	6.8
Alanine aminotransferase, U/L	< 41	25	24
Aspartate aminotransferase, U/L	< 37	22	23
Alkaline phosphatase, U/L	64 - 306	219	213
Urea, mg/dL	19-44	37	31
Creatinine, mg/dL	0.7-1.4	1	0.8
White blood cell count, $\times 10^3/\mu L$	4-10	6.9	7
Hemoglobin, g/dL	14 - 18	15.6	15.5
Hematocrit, %	40 - 54	47	46
Platelet count, $\times 10^3/\mu L$	150 - 450	285	283

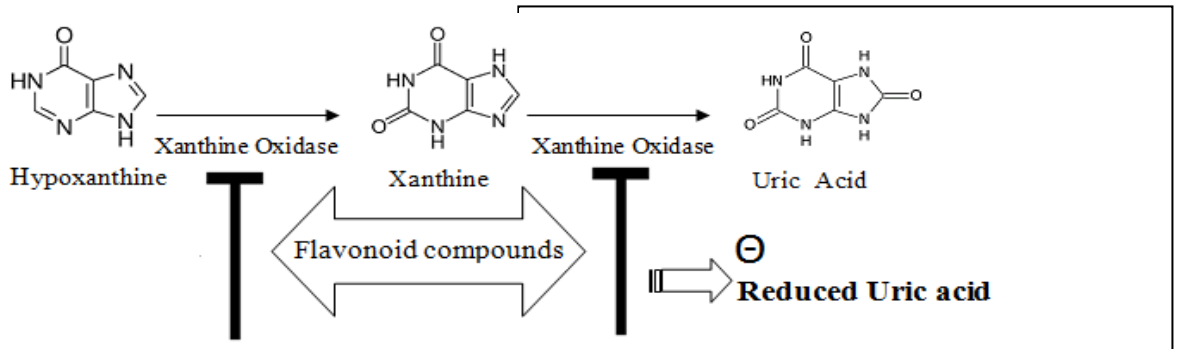

Figure 1. Inhibition of xanthine oxidase enzyme by flavonoid compounds in two pathways of converting hypoxanthine to xanthine and xanthine to uric acid

designed using psyllium seeds with the dose of 83.33 mg/kg of body weight/day for hyperuricemia patients.

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