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Screening of strawberry juice for role in fecal evacuation

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Abstract

Natural food substances have been used since ancient times for treatment of various diseases. They are easily available, cheap and possess fewer side effects. Strawberry also known as *Fragaria ananassa* has been known for its anti-inflammatory, lipid lowering, anti-hypertensive, anti-diabetic and anti-cancer effects. The present study has been designed to evaluate the effect of strawberry juice on fecal evacuation, so it can be incorporated in diet of chronic constipation patients, hemorrhoid patients and in those patients who face slow bowel movements.

The study is carried out on albino mice of either sex weighing 18-25 gm that were first familiarized with metabolic cage and then placed in it after dosing. Mice were divided into 4 groups Standard (given Bisacodyl 5mg/60kg), Control (given 3ml distilled water) and Group III (given 0.3ml strawberry juice) and Group IV (given 0.6ml Strawberry juice). The study was carried out for 15 days.

From our study, we observed control mice defecated 6 feces /24hours, Group III mice defecated 18 feces / 24 hours, Group IV mice defecated 27 feces/24hours whereas Standard's result was 24 feces/ 24 hours. Our Study indicated that strawberry juice can relieve constipation, but the quantity should be monitored increased consumption can lead to diarrhea.

Keywords: Bisacodyl, strawberry juice, constipation, feces, metabolic cage

1. Introduction

Nowadays constipation has become very common problem. Medically Constipation is defined as difficulty in passing stool due to dry and hardened feces formation and incomplete bowel evacuation ^[1]. Earlier it was thought to be more common in elderly people but nowadays due to improper dietary habits it is common in people of all age groups including children ^[2]. The people who face this problem have difficulties performing every day activities due to feeling of uneasiness and discomfort and pain at site of evacuation ^[3]. In Western societies, it is among the most frequent gastrointestinal disorders encountered in clinical practice and more frequently reported in female patients ^[4].

Treatment usually involves advising the patient to drink ample water, increase fibrous diet, if these nonpharmacological treatments are not useful, the patient is treated with bisacodyl which is laxative and causes stimulation of motor activity in colon ^[5]. Mainly it has its action on large intestine and usually shows its effect within 6-12 hours after oral administration and within 15–60 minutes after rectal administration ^[6]. It is a hydrogogue exhibiting, contact laxative action which acts locally in the large bowel and directly enhancing motility and so that the transit time is reduced ^[7] and increasing the water content of the stool making it easy to expel the fecal content out of the body ^[8].

Fragaria Ananassa commonly known as strawberry belongs to family Rosaceae ^[9]. It is commonly cultivated in Tropical and Subtropical countries especially Brazil. Nutritionally one helping of strawberry provides 33 kilocalories of energy ¹⁰. It is rich in carbohydrates (sugars + dietary fibers), contains 0.3 gm fats and 0.67 gms proteins. It is excellent source of vitamins and contains thiamine, pantothenic acid, Riboflavin, Niacin, Vitamin B6, Folate, Vitamin C, vitamin E and vitamin K ^[11]. It also contains Sodium, Potassium, Calcium and trace elements such as Manganese, zinc and Iron ^[12].

Strawberry is very commonly used in food Industry for making Jam, jellies, marmalades, ice-cream, yogurts and other dessert products. It is also used as flavourant and in cosmetic products and deodorants to give odour ^[13]. Research has found strawberry has effects on human health too. It lowers LDL cholesterol and so is beneficial in Cardiovascular Diseases; it lowers hypertension, has anti-inflammatory effect, lowers blood sugar and also possesses anti-cancer effect ^[14].

In strawberry antioxidants are present as well in high level, which reduces the risk of chronic diseases like cancer and heart diseases [15]. It also contain constituents like phenols, carbohydrates and flavonoids [16] like flavonols, anthocyanin, catechins, proanthocyanidins and phenolic acids such as Hydroxy benzoic acid and hydroxyl cinnamic acid [17]. It also contains ellagitannin agrimoniin [18]. Strawberries contain fisetin and possess higher levels of this flavonoid than other fruits. Other polyphenols include ellagic acid, ellagic acid glycosides, and ellagitannins [19].

The present study was designed to evaluate the effect of strawberry juice on fecal discharge so that it could be suggested as non-pharmacological treatment in patients with constipation or those who suffer painful bowel evacuation.

Materials and Method:

Experimental Animals: The animal selected were albino mice of either sex weighing 18-25gm kept at room temperature 25±2 °C in a laboratory environment. They were given food and water ad Libitum.

Material: Fresh strawberries were purchased from local market in Karachi, identified by the Department of Pharmacognosy Jinnah University for Women. The Strawberries were crushed and their juice was taken and filtered.

Dosing Protocol: The animals were divided into 4 groups each containing 7 animals. Group I was taken as control and given 3ml Distilled Water, Group II was taken as Standard and given Bisacodyl 5mg/60kg diluted in 10ml water and adjusted according to weight of animals. Group III was given 0.3ml strawberry juice (named as Treated Group I) and Group IV was given 0.6ml strawberry juice (named as Treated Group II).

Procedure: The metabolic cage was used for collection of fecal content of mice following method by Kurien *et al.* 2004 [20]. The mice were placed (3 mice of same group) in metabolic cage designed in such way to separate urine and feces and one mouse of each group was housed separately in metabolic cage. The Fecal sample was collected after 24 hours in beaker and number of feces were counted. The experiment was carried out for 15 days.

Result and Discussion

From above study, we found out that the mice which were given Bisacodyl the feces collected after 24 hours (7 day dosing) was 23 where as there was no significant difference after 15 day dosing i.e it was 24. The quantity of feces of mice given water (control) was 6 after 7 day dosing and there was no significant difference after 15 day dosing i.e it was 5.

The treated group I which was given 0.3ml strawberry juice showed significant increase in the quantity of feces i.e it was 14 for 7 day dosing and 18 for 15 day dosing. The Treated group II showed highly significant increase in quantity of feces evacuated as compared to control i.e 22 after 7 day dosing and 26 after 15 day dosing.

When Treated group I was compared to standard it was found that the results were highly significant i.e bisacodyl showed more fecal evacuation as compared to 0.3ml strawberry juice where as in case of Treated group II the results were insignificant because both Bisacodyl and 0.6ml strawberry juice showed similar results.

So our results show that if 0.3ml of strawberry juice was given once daily it would increase defecation where as 0.6ml also increased defecation but its chronic use could lead to diarrhea as it was very similar to bisacodyl. So the quantity of strawberry juice taken should be monitored.

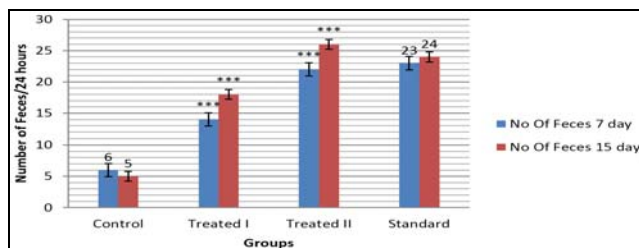
A single strawberry contains carbohydrates (7.6gm) which includes 2gm dietary fiber which is very good for colon because it possesses water holding capacity and provides bulking effect [21], resulting in stool which are less dry and easier to evacuate [22]. Flavanoids present in strawberries also have effect on reducing the pain and in increasing motility, decreasing colonic transit time, they possess anti-oxidant effect too [23]. This nutritional therapy could also be beneficial in people suffering from hemorrhoids that face severe pain and bleeding during defecation [24].

Conclusion

From the above study we can conclude that strawberry juice increases the fecal evacuation in mice but its quantity needs to be monitored so 1 glass/day can be incorporated in diet of those individuals who suffer from constipation and hemorrhoids and further clinical trials can be run to evaluate its use and role in other gastrointestinal problems.

Table 1: Effect of Strawberry Juice on Feces

	Quantity of Feces (After 7 day Dosing)	p- value (control)	p-value (standard)	Quantity of Feces (After 15 day Dosing)	p-value (control)	p-value (standard)
	Mean ± SD			Mean ± SD		
Control	6 ± 1.07			5 ± 0.8		
Standard	23 ± 0.84			24 ± 1.34		
Treated Group I	14 ± 1.03	***0.000	***0.000	18 ± 0.81	***0.000	***0.000
Treated Group II	22 ± 1.03	***0.000	I.S	26 ± 0.94	***0.000	I.S



Graph 1: Effect of Strawberry Juice on Feces

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