



(RESEARCH ARTICLE)



Flaxseed: Knowledge and opinion of first-year pharmacy students

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Abstract

The objective of the survey was to evaluate the knowledge and opinion of Howard University College of Pharmacy first-year professional pharmacy students regarding the use of the nutritional supplement flaxseed. The survey questionnaire comprising 5 knowledge-based and 5 opinion-based items was administered to 42 first year pharmacy students. Most of the respondents had adequate knowledge about flaxseed ranging from 52.4 to 90.5%. There was no statistical difference when responses were analyzed based on the gender, age and prior work experience categories of the survey participants. More than half of the respondents had good levels of knowledge and opinion about flaxseed, with the highest being 90.5% to a specific knowledge question on the use of flaxseed for hyperlipidemia, heart disease, cancer, stroke, and diabetes. The respondents were close to being evenly divided on whether flaxseed can increase appetite and feeling comfortable about recommending it for personal use to lower cholesterol before taking prescription medications (42.8 to 57.2 and 47.6 to 52.4%, respectively).

Keywords: Flaxseed; Lignan; Hyperlipidemia; Cholesterol; Insulin Resistance

1. Introduction

Flaxseed is known by various names such as flax, linseed and linum. The botanical name of the plant is *Linum usitatissimum* L. (family: Linaceae). Linseed oil from the seeds has been used medicinally for various purposes. The German E Commission has approved flaxseed for treatment of chronic constipation, irritable colon, diverticulitis, gastritis, enteritis, and inflammation. Introduced to the North American continent from Europe, flax grows widely in Canada and USA [1]. The small brown seeds of flax from of the Canadian prairies is a rich source of the ω -3 polyunsaturated fatty acid, α -linolenic acid, with a level reaching as high as 55% in the oil [2]. Several preclinical and clinical studies on flaxseed have demonstrated its cardiovascular benefits in hypertension, arrhythmia and lowering of cholesterol, as well as in its antiatherogenic and anti-inflammatory properties. The constituent's α -linolenic acid, the lignan precursor secoisolariciresinol diglucoiside (SDG) and the high fiber content of flaxseed are thought to be responsible for these beneficial effects [3]. SGD is associated with anti-inflammatory activity, thus offering renal protection with the production of the less inflammatory renal prostanoids [1]. The bioactive lignan in flaxseed has also been reported to somewhat decrease insulin resistance secondary to its antioxidant properties [4]. A pilot small-scale study demonstrated a significant cholesterol lowering effects of flaxseed supplementation in patients receiving lipoprotein apheresis treatment [5]. In a four-week placebo-controlled, blinded, and randomized clinical trial by Wong et al. involving 32 pediatric patients, flaxseed failed to provide favorable changes in the lipid profiles of this patient population [6].

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Since flaxseed is an important food supplement with multiple purported medical attributes, we conducted a survey among pharmacy students regarding their knowledge and opinion about the supplement. In this report, we present our findings.

2. Methods

A total of 45 professional first year pharmacy students at Howard University College of Pharmacy for the year 2021 participated in the survey the survey questionnaire comprised 5 knowledge-based and 5 opinion-based items. Forty-two completed the survey (response rate of 93.3%). Demographic data were collected: age, gender, education, residence, work-related information, and annual income. Five knowledge-related and five opinion-based items about flaxseed were included in the questionnaire survey. Descriptive statistics was applied to analyze the data. A 4-point Likert scale (1=strongly agree; 2=agree; 3=disagree; 4=strongly disagree) was used to rate responses. Where appropriate, the strongly agree and agree responses were aggregated to infer “total agree” responses, while the disagree and strongly disagree were combined to conclude “total disagree” responses. Mean Likert scores were calculated to discern closeness to “agree” or “disagree” responses. A two-tailed Fisher’s exact test was applied to determine *p* values for comparing general grouped responses.

3. Results and discussion

Thirty-one survey participants (73.8%) were in the age range of 21 to 26 years (Table 1.) The majority ($n=34$; 81%) had a bachelor’s degree prior to joining pharmacy school (Table 1, Figure 1). Of the 42 respondents, 27 (64.3%) were female. Further demographic data are provided in Table 1. Over 90% of the survey participants agreed that flaxseed reduces cholesterol, risk of heart disease, cancer, stroke, and diabetes. The majority agreed with each of the five knowledge-based questions (Table 2). In the same manner, over 50% of the participants agreed with each of the five opinion-based questions to various degrees with each opinion questions (Table 3).

Table 1 Demographic characteristics of respondents

Characteristics	Respondents (n, %)	95% CI (% range) ¹
Age (years)		
21-23	14 (33.3)	19.1-47.6
24-26	17 (40.5)	25.6-55.3
27-29	5 (11.9)	2.1-21.7
>29	6 (14.3)	3.7-24.9
Gender		
Male	15 (35.7)	21.2-50.2
Female	27 (64.3)	49.8-78.8
Education		
Some college	1 (2.4)	0.0-7.0
Associate Degree	1 (2.4)	0.0-7.0
BA/BSc	34 (81)	69.1-92.8
MSc	4 (9.5)	2.7-22.6
PhD/Professional	2 (4.8)	0.0-11.2
Residence		
Washington, D.C.	4 (9.5)	0.7-18.4
Maryland	13 (31)	16.9-44.9
Virginia	7 (16.7)	5.4-27.9

Other States	18 (42.9)	27.9-57.2
Working now		
Yes	9 (21.4)	9.0-33.8
No	33 (78.6)	66.2-90.9
Work experience		
Never worked	2 (4.8)	0.0-11.2
Short-term	3 (7.1)	0.0-14.9
Part-time	16 (38.1)	23.4-52.8
Full-time	21 (50)	34.9-65.1
Type of job		
Pharmacy related	16 (38.1)	23.4-52.8
Other healthcare	12 (28.6)	14.9-42.2
Non-health related	13 (31)	16.9-44.9
Not applicable	1 (2.4)	0.0-7.0
Annual income		
< USD 10,000	13 (31)	16.9-44.9
10,001-20,000	7 (16.7)	5.4-27.9
20,001-30,000	6 (14.3)	3.7-24.9
30,001-40,000	5 (11.9)	2.1-21.7
>40,000	11 (26.2)	12.9-39.5
Years worked		
None	1 (2.4)	0.0-7.0
1-2	19 (45.2)	30.2-60.3
3-4	11 (26.2)	12.9-39.5
>4	11 (26.2)	12.9-39.6

¹CI = Confidence Interval; normal approximations of binomial exact values.

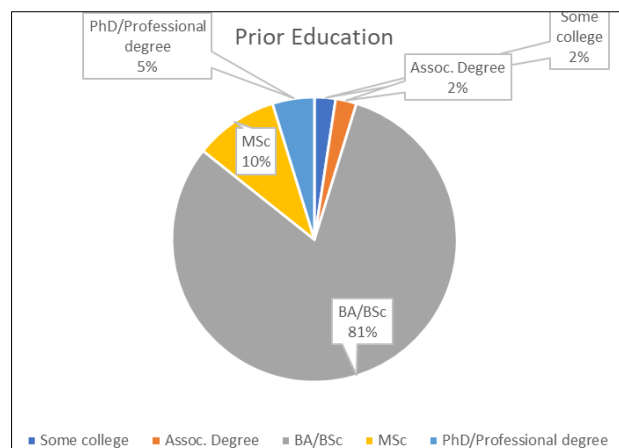


Figure 1 Levels of Education Prior to Joining Pharmacy School

Table 2 Responses to knowledge-related survey questionnaire statements

Survey Statement	Response [n, (%)]						LK (m ±SD)
	SA	A	DA	SDA	TA	TDA	
Flaxseed is a good source of fiber	13 (30.9)	22 (52.4)	2 (4.8)	5 (11.9)	35 (83.3)	7 (16.7)	1.98±0.90
Flaxseed reduces hyperlipidemia, the risk of heart disease, cancer, stroke and diabetes	15 (35.7)	23 (54.8)	2 (4.8)	2 (4.8)	38 (90.5)	4 (9.5)	1.79±0.75
Flaxseed comes from the flax plant	13 (30.9)	22 (52.4)	5 (11.9)	2 (4.8)	35 (83.3)	7 (16.7)	1.90±0.79
Flaxseed can increase appetite	7 (16.7)	15 (35.7)	16 (38.1)	4 (9.5)	22 (52.4)	20 (47.6)	2.40±0.89
Flaxseed can increase insulin binding capacity	9 (21.4)	19 (45.2)	12 (28.5)	2 (4.8)	28 (66.7)	14 (33.3)	2.17±0.82

Abbreviations: SA=strongly agree; A=agree; DA=disagree; SDA=strongly disagree; TA=total agree; TD=total disagree; LK= Likert score; m ± SD=mean ± standard deviation.

Table 3 Responses to opinion-related survey questionnaire statements

Survey Statement	Response [n, (%)]						LK (m ±SD)
	SA	A	DA	SDA	TA	TDA	
I think flaxseed can be beneficial towards an individual’s overall health including reducing high cholesterol levels	13 (31.0)	21 (50.0)	7 (16.7)	1 (2.3)	34 (81.0)	8 (19.0)	1.90±0.76
I believe flaxseed is safe enough to recommend to my patients if needed	13 (30.9)	27 (40.5)	10 (23.8)	2 (4.8)	40 (71.4)	12 (28.6)	2.02±0.87
I believe there are minimal side effects associated with flaxseed since it also consumed as food by many	9 (21.4)	19 (45.2)	10 (23.8)	4 (9.5)	28 (66.7)	14 (33.3)	2.21±0.90
I believe flaxseed can be obtained through ingestion of carbohydrates	11 (26.2)	13 (31.0)	14 (33.3)	4 (9.5)	22 (57.2)	20 (42.8)	2.26±0.96
I feel comfortable to recommend flaxseed or take it myself for lowering high cholesterol before taking any other prescription medications	11 (26.2)	13 (31.0)	14 (33.3)	4 (9.5)	24 (57.2)	18 (42.8)	2.26±1.01

Abbreviations: SA=strongly agree; A=agree; DA=disagree; SDA=strongly disagree; TA=total agree; TD=total disagree; LK= Likert score; m ± SD=mean ± standard deviation.

Gender, age, and prior work areas did not significantly affect the pattern of survey responses ($p > 0.05$ in all cases). In all cases, the mean Likert scores were around a value 2, which leaned closer to the agreement side on the scale (Tables 2 and 3). However, there was a discordance between the magnitude of responses as it related to the acknowledged attributes of flaxseed in reducing cholesterol level and the feeling of the respondents about recommending it for the mentioned purpose (Table 4; $p=0.0010$ and 0.0362). Perhaps the qualifier “before taking any other prescription medications” skewed the responses to a lower agree percentage in comparison to the 90.5% agree rate. Even then, the majority ($n=24$; 57.2%) agreed with the statement.

Table 4 Comparison of Discordant Survey Responses

Knowledge and opinion-based survey statements	Responses (n, %)		P*
	Agree (Total)	Disagree (Total)	
Flaxseed reduces hyperlipidemia, the risk of heart disease, cancer, stroke, and diabetes	38 (90.5)	4 (9.5)	0.0001
I feel comfortable to recommend flaxseed or take it myself for lowering high cholesterol before taking any other prescription medication	24 (57.1)	18 (42.9)	
I think that flaxseed can be beneficial towards an individual's overall health including reducing cholesterol levels	34 (81.0)	8 (19.0)	0.0326
I feel comfortable to recommend flaxseed or take it myself for lowering high cholesterol before taking any other prescription medication	24 (57.1)	18 (42.9)	

p values ≤ 0.05 are considered significant

4. Conclusion

In this survey, more than half of the respondents had good levels of knowledge and opinion about flaxseed, with the highest being 90.5% to a specific knowledge question on the use of flaxseed for hyperlipidemia, heart disease, cancer, stroke, and diabetes. The respondents were close to being evenly divided on whether flaxseed can increase appetite and feeling comfortable about recommending it for personal use to lower cholesterol before taking prescription medications. There was a discordance between the magnitudes of responses as it related to the acknowledged attributes of flaxseed in reducing cholesterol level and the feeling of the respondents about recommending it for the mentioned purpose.

Compliance with ethical standards

Acknowledgments

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Approval

The survey was approved by Howard University IRB as part of a Drug Information teaching course given by one of us (BH).

Disclosure of conflict of interest

The authors declare no conflict of interest.

Statement of informed consent

This survey was conducted as part of HU College of Pharmacy drug information course offered by one of us (BH); therefore it did not require informed consent of survey participants.

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