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Assessment of Student Awareness and Impact of Intervention Regarding Food Adulteration

Prathusha G¹, Radha Rani P², Vijaya Lakshmi V³, Uma Devi K²

ABSTRACT

Food is any substance consumed for nutritional support and good health. It typically consists of carbohydrates, proteins, fats, vitamins and minerals. However, when food becomes adulterated; its beneficial effects are reduced, which in the long term leads to increased morbidity and even mortality. Food adulteration is a common malpractice and an age-old problem in most of the developing countries, causing serious effects on health effects. Therefore, it is rightly considered a crime. Despite strict actions taken against adulteration, it continues to be practiced solely for profit, putting human lives at risk. Globalization has had significant impact on food supply chains, increasing the risk of fraud and contamination. This makes it more difficult for regulatory bodies to uniformly enforce quality standards across regions. As a result, both students and consumers face a higher risk of consuming unsafe food. Students are responsible consumers, can play a major role in the prevention and detection of food adulteration. To educate students effectively, appropriate communication media are necessary to disseminate information. Instructional systems and educational technologies have gained great attention from educators to enhance student learning. Educational tools such as multimedia presentations offer a dynamic and engaging way to share information by combining text, audio, video, graphics and animation. An educational programme on food adulteration was developed and implemented using multimedia. A questionnaire was used to conduct survey and the responses were evaluated using a rating scale. The finding of the study revealed that respondents had limited knowledge about food adulteration before the educational programme, which significantly improved afterward. The study concluded that multimedia educational programme had a positive impact on increasing student's knowledge about food adulteration.

Keywords: student awareness, food adulteration, unsafe food

1. INTRODUCTION

Food is an important and basic biological need for living; it is the foundation of good health. However, people are often uncertain about the safety of the food they consume especially in terms of contamination with extraneous material or intentional adulteration. Food adulteration refers to the addition or removal of any substance to or from food, thereby affecting its natural composition and quality. According to Aamna and Jacob (2016), adulterated food is impure, unsafe, and not wholesome. There is a danger in consuming harmful substances such as poisonous dyes, sawdust, soapstone, industrial starch, aluminium foil, and others that may be added to our daily food, endangering our health. Adulteration of food can lead to various physical problems, including damage to organs. Improper food handling and packaging methods can also result in adulteration (Sudershan et al., 2013).

Adulteration is the act of intentionally degrading the quality of food offered for sale either by mixing or substitution of inferior substances or removing valuable ingredient (Mansuri, 2011). Intentional adulteration is usually done for financial gain, whereas natural adulteration occurs due to the presence of certain chemicals, organic compounds or naturally occurring radicals in foods that are injurious to health. These substances are not added either intentionally or unintentionally (Zarina and Zara, 2010).

Food adulteration is commonly practiced by traders in India and poses a major threat to human health. These days, hardly any food is spared from the malicious practice. Almost every item from milk to fruits, from vegetables to grains is affected by adulterants. Some adulterants enter during agricultural processes, especially when foods are not cleaned properly. These are visible adulterants such as stones, leaves, soil, sand and dust. Fortunately, they can often be removed by consumer, making them less harmful. However, invisible adulterants, or those cleverly camouflaged to match the food's color or texture, are intentionally added and are usually harmful to health. Many of them lead to serious health conditions such as cancer. Adulterant reduces the quality of the food. Regular consumption of adulterated food can result in a range of health issues from curable to incurable disorders thereby increasing healthcare costs and ultimately affecting one's lifestyle and overall quality of life.

Objectives

1. To assess the level of awareness among high school students regarding food adulteration.
2. To evaluate the impact of educational intervention in creating awareness about food adulteration among high school students.

Review of Literature

A study on assessment of student awareness and effectiveness of planned teaching programme on adulteration of food, was conducted in Mumbai city. It was observed that after the awareness programme, 18% seemed to have very good knowledge, 48% had good knowledge, and 34% had poor knowledge about the basics of food adulteration. (Krystel and Rekha, 2018).

Tiwari (2016) conducted a study on food adulterants and awareness about adulteration among students of Gorakhpur district and found that 72% students had knowledge about adulterants of wheat and rice, Bengal gram, red gram dhal, green pea, black pepper, asafetida (Hing), cinnamon (dalchini), cumin, bay leaf (tejpatta) and honey. However, they lacked awareness about adulterants in wheat flour, liquid milk, and vegetable oils, vegetable fats, gram flour, turmeric, coriander seed powder, chili powder, cloves, powdered sugar, coffee and common salt. The majority of the students were aware only of the "AGMARK" certification and were not aware of the health problems and diseases caused by food adulteration.

Radharani and Renuka (2012) carried a study on consumer education through multimedia- an evaluation study. The study reported that 45% of employed and 68.3% of unemployed respondents were aware of ill effect of food adulteration.

Mukherjee (2018) in his study of Role of Multimedia in Education explained that the rapid rise and development of information technology has provided a better framework for exploring new teaching model. Using multimedia to create a context for teaching communication skill has its unique advantages. As a result, technology plays a very important role in teaching communication skill.

Fen (2017) carried a study on multimedia applications for educational purposes and highlighted that multimedia can emphasize important points more effectively than traditional methods such as writing on the whiteboard. There is no doubt about the significant role of multimedia in education. This new learning context is expected to greatly influence the way teachers or lecturers teach and students learn, as both groups continually seek more effective methods to enhance engagement and improve learning outcomes.

2. METHODOLOGY

The research design followed was Action Research. Samples were randomly drawn from four zones of the twin cities of Hyderabad and Secunderabad in Telangana, with a total sample size of 120 high school children, this included 30 students each from two private schools and 30 each from two government schools, all from 9th grade, with an equal proportion of girls and boys. (i.e.15 girls and 15 boys per school), aged between 13 to 15 years. Data were collected using a structured questionnaire. The questionnaires were handed over to the students with a request to select the appropriate option for each question. All participants responded to every question making all 120 responses valid. This population was chosen due to their increased exposure and susceptibility to various marketing strategies targeted at children and adolescents, particularly in relation to food products.

3. RESULTS AND DISCUSSIONS

Back ground information

The sample group is a heterogeneous group, consisting of 60 girls and 60 boys from private and government schools, all pursuing 9th grade. All the participants are from Hyderabad, and their age group ranges from 13 to 15 years.

Table 1. Distribution of respondents based on the general awareness of food adulteration

Response	Private girls	Private boys	Government girls	Government boys
Yes	19(63)	15(50)	16(53)	24(80)
No	11(37)	15(50)	14(47)	6(20)

(Figures in parenthesis indicate percentage)

Table 1 explains that the 80 per cent of government school boys were aware of food adulteration followed by private school girls (63%), government school girls (53%) and private school boys (50%).

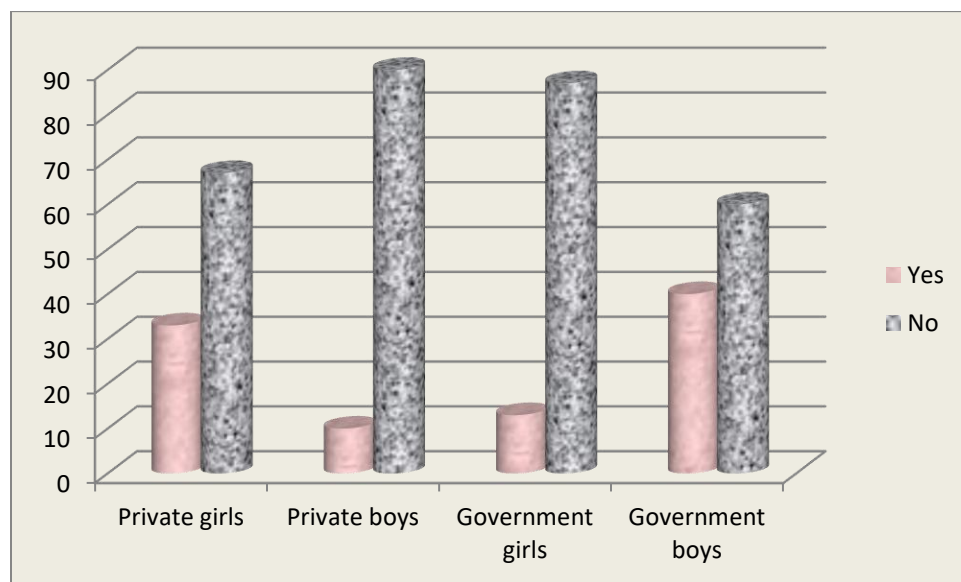


Fig. 1 Respondents awareness about meaning of food adulteration

Fig. 1 shows that highest percentage (40%) of the government school boys gave the correct meaning of food adulteration followed by 33% of private girls, 13% of government school girls and the lowest, only 10% of private school boys who were able to give correct meaning of food adulteration. Dhanvijay and Ambekar (2015) classified the awareness on the meaning of the food adulteration into low, medium and high levels. The results revealed that 20% of respondents had low awareness, 50% had medium awareness, and 30% had high awareness regarding the meaning of food adulteration.

Table 2 shows that more than 80% of both private school girls and government school boy, 83% of private school boys and 73% of government school girls were aware of adulterants used in rice before intervention. This awareness increased after the intervention to 97% girls and 100% boys of private school, 93% of girls and 97% of boys of government school. Regarding awareness of health problems caused by adulterants in rice, 53% of private school girls, 20% private school boys, 17% of government school girls and nearly one fourth 23 % of the government school boys had some level of awareness before the intervention, which increased after the intervention to 87 %, 83%, 77% and 73% of girls and boys studying in private school and government school respectively. Awareness level regarding detection methods of adulterants also increased significantly from 67% to 97% of private school girls, 60% to 90% of private school boys, half of the respondents 50% to 73% of government school girls and 33% to very high 90% of government school boys.

Table 2. Distribution of respondents based on awareness on adulterants used, health problems and detection methods in Cereals and Cereal based products

Cereals and Cereal based product	Type of School	Gender	Awareness					
			Adulterants used commonly		Health Problems		Detection methods	
			Pre test	Post Test	Pre Test	Post Test	Pre Test	Post test
Rice	Private School	Girls	24(80)	29(97)	16(53)	26(87)	20(67)	29(97)
		Boys	25(83)	30(100)	6(20)	25(83)	18(60)	27(90)
	Government school	Girls	22(73)	28(93)	5(17)	23(77)	15(50)	22(73)
		Boys	24(80)	29(97)	7(23)	22(73)	10(33)	27(90)
Wheat	Private School	Girls	15(50)	26(87)	10(33)	23(77)	7(23)	18(60)
		Boys	8(27)	24(80)	3(10)	23 (77)	4(13)	18(60)
	Government school	Girls	14(47)	23(77)	4(13)	21(70)	6(20)	23(77)
		Boys	8(27)	22(73)	2(7)	15(50)	1(3)	18(60)
Rawa	Private School	Girls	9(30)	20(67)	4(13)	17(57)	6(20)	16(53)
		Boys	8(27)	18(60)	1(3)	15(50)	3(10)	14(47)
	Government school	Girls	8(27)	24(80)	1(3)	19(63)	2(7)	17(57)
		Boys	4(13)	21(70)	-	14(47)	-	16(53)
Jowar	Private School	Girls	8(27)	19(63)	4(13)	15(50)	4(13)	18(60)
		Boys	4(13)	15(50)	2(7)	11(37)	1(3)	17(57)
	Government school	Girls	5(17)	16(53)	1(3)	10(33)	1(3)	9(30)
		Boys	1(3)	19(63)	-	15(50)	-	3(10)
Wheat flour	Private School	Girls	2(7)	23(77)	2(7)	21(70)	1(3)	17(57)
		Boys	4(13)	21(70)	3(10)	16(53)	2(7)	14(47)
	Government school	Girls	3(10)	22(73)	-	13(43)	-	13(43)
		Boys	5(17)	21(70)	1(3)	17(57)	-	13(43)
Maida	Private School	Girls	1(3)	17(57)	1(3)	8(27)	-	7(23)
		Boys	-	11(37)	-	7(23)	-	9(30)
	Government school	Girls	1(3)	16(53)	-	9(30)	-	8(27)
		Boys	3(10)	19(63)	2(7)	12(40)	2(7)	11(37)

(Figures in parenthesis indicate percentage)

Regarding adulterants used in wheat, half (50%) of the respondents from private school girls, 27 per cent private school boys, nearly half (47%) of government school girls, and 27 per cent of government school boys were aware before the intervention. This awareness

improved to 87 per cent of girls and 80 per cent among boys in the private school and to 77 per cent among girls and 73 per cent among boys in government school respectively.

Before the intervention, 33 per cent of private school girls, 10 per cent of private school boys, 13 per cent of government school girls, and 7 per cent of government school boys were aware of the health problems caused by adulterants in wheat. After the intervention, this awareness increased to 77 per cent each among private school girls and boys, 70 per cent among government school girls, and 50 per cent among government school boys.

Regarding the detection methods of adulterants in wheat, only 23 per cent of private school girls and 20 per cent of private school boys were aware before the intervention. This increased to 60 per cent each after the intervention. Similarly, awareness among government school girls increased from 13 per cent to 77 per cent, and among government school boys from 7 per cent to 60 per cent.

Almost 30 per cent of private school girls, 27 per cent each of private school boys and government school girls, and 13 per cent of government school boys were aware of the adulterants used in Rawa before the intervention. After the intervention program, awareness increased to 67 per cent among private school girls, 60 per cent among private school boys, 80 per cent among government school girls, and 70 per cent among government school boys.

Regarding awareness of health problems caused by adulterants in Rawa, only 13 per cent of private school girls, and 3 per cent each of private school boys and government school girls were aware before the intervention. This increased to 57 per cent of girls and 50 per cent of boys in private schools, and 63 per cent of girls and 47 per cent of boys in government schools.

With regard to awareness of detection methods, it increased from 20 per cent to 53 per cent among private school girls, from 10 per cent to 47 per cent among private school boys, from 7 per cent to 57 per cent among government school girls, and from no awareness to 53 per cent among government school boys.

Regarding adulterants used in Jowar, 27 per cent of private school girls, 13 per cent of private school boys, 17 per cent of government school girls, and 3 per cent of government school boys were aware before the intervention. After the intervention program, awareness increased to 63 per cent, 50 per cent, 53 per cent, and 63 per cent among the respective groups.

Awareness regarding the health problems caused by adulterants in Jowar also improved significantly after the intervention. It increased from 13 per cent to 50 per cent among private school girls, from 7 per cent to 37 per cent among private school boys, from 3 per cent to 33 per cent among government school girls, and from no awareness to 50 per cent among government school boys.

Among private school girls, awareness of the detection methods for adulterants in Jowar increased from 13 per cent before the intervention to 60 per cent after. Similarly, among private school boys, awareness rose from 3 per cent to 57 per cent. Among government school boys, no one was aware before the intervention; after the intervention, 10 per cent were aware.

Very few girl respondents from private schools (7%), 13 per cent of private school boys, 10 per cent of government school girls, and 17 per cent of government school boys were aware of adulterants used in wheat flour before the intervention. After the intervention, awareness improved to 77 per cent among girls and 70 per cent among boys in private schools, and 73 per cent among girls and 70 per cent among boys in government schools.

Regarding awareness of health problems caused by adulterants, only 7 per cent of private school girls, 10 per cent of private school boys, and 3 per cent of government school boys were aware before the intervention. This increased to 70, 53, 43, and 57 per cent among girls and boys in private and government schools, respectively, after the intervention.

With regard to detection methods, only 3 per cent of private school girls and 7 per cent of private school boys were aware in the pre-test. In the post-test, awareness increased to 57 per cent among girls and 47 per cent among boys in private schools, and 43 per cent among both girls and boys in government schools.

In the pre-test, only 3 per cent of girls from both private and government schools and 10 per cent of boys from government schools were aware of adulterants used in maida. In the post-test, the awareness levels increased to 57, 37, 53, and 63 per cent among girls and boys from private and government schools, respectively.

Regarding health problems caused by adulterants, awareness among private school girls increased from 3 per cent to 27 per cent, from none to 37 per cent among private school boys, from none to 37 per cent among government school girls, and from 7 per cent to 40 per cent among government school boys.

Before the intervention, only 7 per cent of government school boys were aware of detection methods. After the intervention, awareness increased to 23, 30, 27, and 37 per cent among girls and boys from private and government schools, respectively.

In the present study majority of the respondents had awareness regarding adulterants used in food grains and its products. Respondents mentioned that rice was being adulterated with stones by 80 each of private school girls and government school boys and nearly 83 per cent of boys from private school and 73 per cent of girls from government school. Shreedevi and Renuka (2014) in their study, revealed that majority of boys (89.33%) and Girls (57.33%) had knowledge in detection of adulterants in Rice.

From Table 3, it is evident that, regarding awareness of adulterants used in dhal, 37 per cent of girls and 33 per cent of boys from private schools, only 13 per cent of girls, and 27 per cent of boys from government schools scored marks in the pre-test. After the intervention program, 77 per cent of both girls and boys from private schools, and 73 per cent of girls and 77 per cent of boys from government schools scored marks.

The intervention program increased the awareness of health problems caused by adulterants in dhal from a very low 20 per cent to 40 per cent among private school girls, from 7 per cent to 40 per cent among private school boys, from none to 43 per cent among government school girls, and from 23 per cent to 43 per cent among government school boys.

Table 3. Distribution of respondents based on awareness on adulterants used in health problems and detection methods in Pulses and pulses-based products

Pulses and pulses based products	Type of School	Gender	Awareness					
			Adulterants used commonly		Health Problems		Detection Methods	
			Pre Test	Post Test	Pre Test	Post Test	Pre test	Post Test
Dhal	Private School	Girls	11(37)	23(77)	6(20)	12(40)	5(17)	20(67)
		Boys	10(33)	23(77)	2(7)	12(40)	6(20)	18(60)
	Government school	Girls	4(13)	22(73)	-	13(43)	-	13(43)
		Boys	8(27)	23(77)	1(3)	13(43)	1(3)	15(50)
Bengal gram flour	Private School	Girls	-	22(73)	-	20(67)	-	21(70)
		Boys	2(7)	23(77)	1(3)	21(70)	1(3)	20(67)
	Government school	Girls	1(3)	22(73)	1(3)	21(70)	1(3)	14(47)
		Boys	3(10)	23(77)	1(3)	17(57)	-	17(57)

(Figures in parenthesis indicate percentage)

Awareness of detection methods increased from 17 per cent of private school girls, 20 per cent of private school boys, and 3 per cent of government school boys in the pre-test to 67 per cent, 60 per cent, 43 per cent, and 50 per cent among girls and boys from private and government schools, respectively, in the post-test.

After the intervention, the awareness level regarding adulterants used in Bengal gram flour increased from none to 73 per cent among private school girls, from a very low 7 per cent to 77 per cent among private school boys, from 3 per cent to 73 per cent among government school girls, and from 10 per cent to 77 per cent among government school boys.

Before the intervention, only a small percentage of private school boys, government school girls, and government school boys were aware of the health problems caused by adulterants in rice. After the intervention, this awareness increased to 67 per cent among private school girls, 70 per cent among both private school boys and government school girls, and 57 per cent among government school boys.

In the pre-test, only 3 per cent of private school boys and government school girls were aware of the detection methods for adulterants in Bengal gram flour. In the post-test, nearly 70 per cent of girls and 67 per cent of boys from private schools, and 47 per cent of girls and 57 per cent of boys from government schools were aware of these detection methods.

A few respondents mentioned that wheat, rawa, and jowar were being adulterated with weed seeds, twigs, stones, etc. They also stated that colour was added to dhal and starch powder was mixed with wheat flour, Bengal gram flour, and maida. Dhanvijay and Ambekar (2015) reported similar findings, where 100 per cent of respondents were aware of adulterants in cereals.

In the present study, very few respondents were aware of the health problems caused by adulterants and the detection methods for adulterants in food grains and their products. However, Shreedevi and Renuka (2014) found that 65.33 per cent of boys and 48 per cent of girls had knowledge of detecting adulterants in dhal.

Table 4. Distribution of respondents based on awareness on adulterants used, health problems and detection methods in Milk and milk products

Milk and milk products	Type of school	Gender	Awareness					
			Adulterants used commonly		Health Problems		Detection methods	
			Pre test	Post Test	Pre Test	Post Test	Pre Test	Post test
Milk (liquid/ powder)	Private School	Girls	16(53)	28(93)	6(20)	23(77)	7(23)	24(80)
		Boys	20(67)	25(83)	2(7)	17(57)	2(7)	15(50)
	Government school	Girls	29(87)	26(87)	2(7)	18(60)	-	15(50)
		Boys	25(83)	29(97)	5(17)	23(77)	2(7)	21(70)
Ghee/but ter	Private School	Girls	12(40)	22(73)	6(20)	14(47)	-	12(40)
		Boys	1(3)	22(73)	-	13(43)	-	11(37)
	Government school	Girls	1(3)	21(70)	1(3)	16(53)	-	14(47)
		Boys	4(13)	21(70)	2(7)	15(50)	2(7)	14(47)
Paneer/k Hova	Private School	Girls	1(3)	16(53)	-	4(13)	-	3(10)
		Boys	-	10(33)	-	7(23)	-	6(20)
	Government school	Girls	-	14(47)	-	8(27)	-	6(20)
		Boys	6(20)	17(57)	-	6(20)	-	5(17)

(Figures in parenthesis indicate percentage)

Table 4 shows that more than half (53%) of the girl respondents from private schools, 67 per cent of the boy respondents from the same schools, a majority of 87 per cent of girl respondents from government schools, and 83 per cent of boy respondents from the same schools were aware of commonly used adulterants in milk. After the intervention, this awareness increased to 93, 83, 87, and 97 per cent among girls and boys studying in private and government schools, respectively. These findings are supported by Shreedevi and Renuka (2014), who reported that the intervention program increased the knowledge level to 100 per cent among girls and 86 per cent among boys. Similarly, Dhanvijay and Ambekar (2015) found that all respondents were aware of milk being adulterated with water, and over 80 per cent were aware of the adulteration of milk with urea.

This is further supported by Tiwari (2016), whose study revealed that 75 per cent of shopkeepers and vendors agreed that selling milk with added water constitutes adulteration, and about 78 per cent perceived selling sour milk as a form of adulteration. The intervention increased awareness about the health problems caused by adulterants in milk from 20 per cent to 77 per cent among private school girls; from 7 per cent to 57 per cent among private school boys; from 7 per cent to 60 per cent among government school girls; and from 17 per cent to 77 per cent among government school boys.

Tiwari et al. (2013), in their study conducted in two selected districts of Delhi, observed that awareness about the specific effects of milk adulteration on human health was very low. Some respondents mentioned that pesticides in milk could cause cancer. In the pre-test, nearly 23 per cent of private school girls and 7 per cent each of private school boys and government school girls were aware of detection methods for adulteration in milk. After the intervention, this awareness increased to 80 per cent among private school girls, 50 per cent among private school boys, and 50 per cent of government school girls and 70 per cent of government school boys.

Tiwari et al. (2013) observed that awareness about the simplest methods of detecting adulteration in milk was quite low. Similarly, Shreedevi and Renuka (2014) reported that knowledge levels about detection methods increased to 67 per cent among girls and 89 per cent among boys after the intervention program. With regard to adulterants used in ghee/butter, education through the intervention program increased awareness from 40 per cent to 73 per cent among girl respondents from government schools, from 3 per cent to 73

per cent among private school boys, from 3 per cent to 70 per cent among government school girls, and from 13 per cent to 70 per cent among government school boys. These respondents became aware that ghee is often adulterated with Dalda, vegetable oils, and similar substances.

According to Tiwari et al. (2013), 65 per cent of housewives were aware that ghee is adulterated with Dalda and other vegetable oils. Regarding health problems caused by adulterants in ghee/butter, very few respondents were aware in the pre-test—only 20 per cent of private school girls, 3 per cent of government school girls, and 7 per cent of government school boys. After the intervention, this awareness increased to 47, 43, 53, and 50 per cent among girls and boys from private and government schools, respectively.

In terms of detection methods, only 7 per cent of government school boys were aware of how to detect adulterants in ghee during the pre-test. In the post-test, awareness increased to 40 per cent among girls and 37 per cent among boys in private schools, and 47 per cent each among girls and boys in government schools.

Before the intervention, only 3 per cent of private school girls and 20 per cent of government school boys were aware of adulterants used in paneer/khova. After the intervention, awareness levels increased to 53 per cent among private school girls, 33 per cent among private school boys, 47 per cent among government school girls, and 57 per cent among government school boys.

Regarding health problems caused by adulterants, 13 per cent of girls and 23 per cent of boys in private schools, and 47 per cent of girls and 57 per cent of boys in government schools were aware. In terms of detection methods, 10 per cent of private school girls, 20 per cent each of private school boys and government school girls, and 17 per cent of government school boys were aware of how to detect adulterants in paneer/khova.

Table 5 shows that awareness of adulterants in turmeric powder increased significantly after the intervention from 27 per cent to 87 per cent among private school girls, and from 23 per cent to 87 per cent among boys from the same school. Among government school students, awareness increased from 53 per cent to 87 per cent for girls, and from 67 per cent to 93 per cent for boys.

Table 5. Distribution of respondents based on awareness on adulterants used, health problems and detection methods in Spices and condiments

Spices and condiments	Type of School	Gender	Awareness					
			Adulterants used commonly		Health problems		Detection methods	
			Pre Test	Post test	Pre Test	Post test	Pre test	Post test
Turmeric powder	Private School	Girls	8(27)	26(87)	5(17)	18(60)	2(7)	19(63)
		Boys	7(23)	26(87)	2(7)	15(50)	-	17(57)
	Government school	Girls	16(53)	26(87)	2(7)	18(60)	3(10)	17(57)
		Boys	20(67)	28(93)	2(7)	20(67)	3(10)	15(50)
Chilli Powder	Private School	Girls	6(20)	20(67)	1(3)	14(47)	-	18(60)
		Boys	5(17)	25(83)	2(7)	13(43)	-	15(50)
	Government school	Girls	14(47)	23(77)	2(7)	18(60)	2(7)	18(60)
		Boys	21(70)	27(90)	7(23)	20(67)	4(13)	20(67)
Cumin Seeds	Private School	Girls	-	16(53)	-	13(43)	-	15(50)
		Boys	1(3)	16(53)	-	15(50)	-	13(43)
	Government school	Girls	2(7)	19(63)	-	15(50)	-	11(37)
		Boys	1(3)	20(67)	-	14(47)	-	13(43)
Mustard seeds	Private School	Girls	-	13(43)	-	9(30)	-	11(37)
		Boys	-	16(53)	-	10(33)	-	11(37)
	Government school	Girls	1(3)	29(97)	-	11(37)	-	13(43)
		Boys	1(3)	18(60)	-	12(40)	-	10(33)
Pepper	Private School	Girls	3(10)	24(80)	1(3)	14(47)	2(7)	18(60)
		Boys	1(3)	26(87)	1(3)	16(53)	1(3)	16(53)

Cardamom	Government school	Girls	7(23)	23(77)	-	15(50)	-	20(67)
		Boys	4(13)	23(77)	1(3)	17(57)	1(3)	17(57)
	Private School	Girls	-	26(87)	-	4(13)	-	17(57)
		Boys	-	21(70)	-	6(20)	-	11(37)
	Government school	Girls	-	16(53)	-	8(27)	-	11(37)
		Boys	-	20(67)	-	10(33)	-	12(40)
Coriander powder	Private	Girls	-	18(60)	-	14(47)	-	18(60)
	School	Boys	1(3)	19(63)	-	13(43)	-	11(37)
	Government school	Girls	3(10)	19(63)	-	11(37)	-	16(53)
		Boys	11(37)	20(67)	1(3)	13(43)	-	14(47)
Cloves	Private	Girls	-	13(43)	-	8(27)	-	8(27)
	School	Boys	-	15(50)	-	10(33)	-	11(37)
	Government school	Girls	-	16(53)	-	10(33)	-	11(37)
		Boys	1(3)	14(47)	-	5(17)	-	7(23)

(Figures in parenthesis indicate percentage)

These results are supported by Shreedevi and Renuka (2014), who found that the intervention increased knowledge levels to 80 per cent among girls and 86 per cent among boys. Similarly, Only 17 per cent of private school girls and 7 per cent each of private school boys, government school girls, and boys were aware of the health problems caused by adulterants in turmeric powder during the pre-test. After the intervention, awareness increased to 60 per cent among girls from both private and government schools, 50 per cent among private school boys, and 67 per cent among government school boys.

Before the intervention, only 7 per cent of private school girls and 10 per cent each of government school girls and boys were aware of the detection methods for adulterants in turmeric powder. After the intervention, awareness rose to 63 per cent among private school girls, 57 per cent each among private school boys and government school girls, and 50 per cent among government school boys.

Educational intervention improved the awareness levels about adulterants used in chilli powder from 20 per cent to 67 per cent among private school girls, and from 17 per cent to 83 per cent among private school boys. Similarly, awareness increased from 47 per cent to 77 per cent among government school girls, and from 70 per cent to 90 per cent among government school boys.

Regarding health problems caused by adulterants in chilli powder, only 3 per cent of private school girls, 7 per cent each of private school boys and government school girls, and 23 per cent of government school boys were aware before the intervention. After the intervention, awareness increased to 47 per cent among private school girls, 43 per cent among private school boys, 60 per cent among government school girls, and 67 per cent among government school boys.

In the pre-test, very few respondents 7 per cent of girls and 13 per cent of boys from government schools were aware of detection methods. In the post-test, this awareness increased to 60 per cent among girls from both private and government schools, 50 per cent among private school boys, and 67 per cent among government school boys. Very few students were aware of adulterants in cumin seeds during the pre-test—only 3 per cent of boys from both private and government schools, and 7 per cent of government school girls. After the intervention, awareness increased to 53 per cent each among girls and boys from private schools, 63 per cent among government school girls, and 67 per cent among government school boys.

In the post-test, 43 per cent of private school girls, 50 per cent each of private school boys and government school girls, and 47 per cent of government school boys scored marks related to awareness of health problems caused by adulterants. Regarding detection methods, nearly 50 per cent of private school girls, 43 per cent of private school boys, 37 per cent of government school girls, and 43 per cent of government school boys demonstrated awareness in the post-test.

A very small percentage of both girls and boys were aware of adulterants used in mustard seeds during the pre-test. However, after the intervention, awareness increased to 43 per cent among private school girls, 53 per cent among private school boys, 97 per cent among government school girls, and 60 per cent among government school boys. Regarding health problems caused by adulterants, 30 per cent of girls and 33 per cent of boys in private schools, and 37 per cent of girls and 40 per cent of boys in government schools were aware after the intervention.

In terms of detection methods, 37 per cent each of girls and boys from private schools, 43 per cent of government school girls, and 33 per cent of government school boys were aware in the post-test. With regard to adulterants used in pepper, the intervention increased awareness levels from 10 per cent to 80 per cent among private school girls, from 3 per cent to 87 per cent among private school boys, from 23 per cent to 77 per cent among government school girls, and from 13 per cent to 77 per cent among government school boys.

Before the intervention, only 3 per cent each of girls and boys from private schools and boys from government schools were aware of the health problems caused by adulterants. After the intervention, this awareness increased to 47 per cent among private school girls, 53 per cent among private school boys, 50 per cent among government school girls, and 57 per cent among government school boys.

Regarding detection methods, only 7 per cent of private school girls and 3 per cent each of boys from private and government schools were aware in the pre-test. In the post-test, awareness increased to 60 per cent among private school girls, 53 per cent among private school boys, and 67 per cent of government school girls and 57 per cent of government school boys. The intervention program increased the awareness level of respondents regarding adulterants in cardamom to 87 per cent among girls and 70 per cent among boys in private schools, and to 53 per cent among girls and 67 per cent among boys in government schools. Awareness of health problems caused by adulterants in cardamom was observed among 13 per cent of girls and 20 per cent of boys in private schools, and 27 per cent of girls and 33 per cent of boys in government schools.

Regarding detection methods, 57 per cent of private school girls, 37 per cent of private school boys, 37 per cent of government school girls, and 40 per cent of government school boys were aware in the post-test. Commonly used adulterants in coriander powder were known by only 3 per cent of boys from private schools, 10 per cent of girls, and 37 per cent of boys from government schools in the pre-test. After the intervention, awareness increased to 60 per cent among private school girls, 63 per cent each among private school boys and government school girls, and 67 per cent among government school boys.

In the pre-test, only 3 per cent of government school boys were aware of the health problems caused by adulterants in coriander powder. In the post-test, awareness rose to 47 per cent of girls and 43 per cent of boys in private schools, and 37 per cent of girls and 43 per cent of boys in government schools. With regard to detection methods, only 3 per cent of government school boys were aware in the pre-test. After the intervention, awareness increased to 60 per cent among private school girls, 37 per cent among private school boys, and 53 per cent of government school girls and 47 per cent of government school boys.

Before the intervention, only 3 per cent of government school boys were aware of adulterants used in cloves. After the intervention, awareness increased to 43 per cent among private school girls, 50 per cent among private school boys, 53 per cent among government school girls, and 47 per cent among government school boys. The intervention also increased awareness about the health problems caused by adulterants in cloves 27 per cent of private school girls, and 33 per cent each of private school boys and government school girls, along with 17 per cent of government school boys, became aware after the program. Regarding detection methods, 27 per cent of private school girls, 37 per cent of private school boys, 37 per cent of government school girls, and 23 per cent of government school boys were aware in the post-test.

In the present study, respondents reported that spices were adulterated with sawdust, powders, and added colours. Similar findings were reported by Dhanvijay and Ambekar (2015), where respondents were aware of adulterants such as brick powder (68%), sawdust (58%), and colorants (95%) in spices.

Table 6 shows that, in the case of coffee powder, only 10 per cent of girls from private schools, 27 per cent of girls, and 37 per cent of boys from government schools were aware of adulterants in the pre-test. After the intervention, awareness increased to 77 per cent among both girls and boys from private schools, 77 per cent of boys from government schools, and 70 per cent of girls from government schools. Respondents mentioned that colours and date seed powder are commonly used as adulterants in coffee powder. These findings are supported by Dhanvijay and Ambekar (2015), who reported that respondents were aware of adulterants such as chicory powder (12%) and tamarind seeds (2%) in coffee powder.

Table 6. Distribution of respondents based on awareness on adulterants used, health problems and detection methods in miscellaneous items

Miscellaneous	Type of school	Gender	Awareness					
			Adulterants used commonly		Health problems		Detection methods	
			Pre test	Post test	Pre Test	Post test	Pre test	Post test
Coffee Powder	Private school	Girls	3(10)	23(77)	-	14(47)	-	10(33)
		Boys	-	23(77)	-	12(40)	-	20(66)
	Government school	Girls	8(27)	21(70)	-	13(43)	-	19(63)
		Boys	11(37)	23(77)	7(23)	17(57)	-	20(66)
Tea Powder	Private school	Girls	3(10)	24(80)	-	17(57)	-	22(73)
		Boys	1(3)	23(77)	-	15(50)	-	20(66)
	Government school	Girls	2(7)	18(60)	-	13(43)	-	14(47)
		Boys	2(7)	22(73)	1(3)	17(57)	-	20(67)
Edible oil	Private school	Girls	5(17)	20(67)	4(13)	14(47)	-	9(30)
		Boys	5(17)	17(57)	39(10)	13(43)	-	17(57)
	Government school	Girls	6(20)	18(60)	-	11(37)	1(3)	5(17)
		Boys	10(33)	17(57)	-	7(23)	-	6(20)
Honey	Private school	Girls	5(17)	25(83)	4(13)	16(53)	-	17(57)
		Boys	5(17)	25(83)	1(3)	17(57)	-	18(60)
	Government school	Girls	6(20)	23(63)	1(3)	19(63)	-	17(57)
		Boys	9(30)	21(70)	4(13)	16(53)	-	18(60)
Salt/sugar	Private school	Girls	-	20(67)	-	16(53)	-	15(50)
		Boys	1(3)	21(70)	-	17(57)	-	14(47)
	Government school	Girls	6(20)	22(73)	-	14(47)	-	13(43)
		Boys	9(30)	19(63)	-	11(37)	1(3)	14(47)

(Figures in parenthesis indicate percentage)

Before the intervention, only 23 per cent of government school boys were aware of health problems such as diarrhoea and vomiting caused by adulterants in coffee powder. After the intervention program, awareness increased to 47 per cent among private school girls, 40 per cent among private school boys, 43 per cent among government school girls, and 57 per cent among government school boys.

Regarding detection methods for adulterants in coffee powder, 33 per cent of private school girls, 66 per cent of boys from both private and government schools, and 63 per cent of government school boys were aware in the post-test. The intervention program increased awareness about adulterants in tea from 10 per cent to 80 per cent among private school girls, and from 3 per cent to 77 per cent among private school boys. Similarly, awareness among government school students increased from 7 per cent to 60 per cent for girls, and to 73 per cent for boys. Only 3 per cent of government school boys were aware of adulterants in tea during the pre-test. After the intervention, awareness of health problems caused by adulterants in tea rose to 57 per cent among private school girls and government school boys, 50 per cent among private school boys, and 43 per cent among government school girls.

Regarding detection methods for adulterants in tea powder, 73 per cent of private school girls, 66 per cent of private school boys, 47 per cent of government school girls, and 67 per cent of government school boys gained knowledge through the intervention. With respect to adulterants used in edible oil, 17 per cent each of private school girls and boys, 20 per cent of government school girls, and 33 per cent of government school boys were aware in the pre-test. After the intervention, awareness increased to 67 per cent among private school girls, 57 per cent among both private and government school boys, and 60 per cent among government school girls.

In terms of health problems caused by adulterants in edible oil, only 13 per cent of girls and 10 per cent of boys were aware in the pre-test. After the intervention, this increased to 47 per cent of private school girls, 43 per cent of private school boys, 37 per cent of

government school girls, and 23 per cent of government school boys. Only 3 per cent of government school boys were aware of the detection methods for adulterated oil in the pre-test. After the intervention program, awareness increased to 30 per cent among private school girls, 57 per cent among private school boys, 17 per cent among government school girls, and 20 per cent among government school boys.

The intervention program also increased knowledge regarding adulterants in honey—from 17 per cent of the total sample to 83 per cent, including all girls and boys from private schools. Among government school students, awareness rose from 20 per cent to 63 per cent among girls, and from 30 per cent to 70 per cent among boys.

In the pre-test, only 13 per cent of private school girls, 13 per cent of government school boys, and just 3 per cent each of private school boys and government school girls were aware of the health problems caused by adulterated honey. In the post-test, this increased to 53 per cent each among private school girls and government school boys, 57 per cent among private school boys, and 63 per cent among government school girls. Following the educational intervention, awareness of detection methods for adulterants in honey increased to 57 per cent among both private and government school girls, and 60 per cent among both private and government school boys.

Regarding awareness of adulterants in sugar and salt, very few respondents were aware during the pre-test only 3 per cent of private school boys, 20 per cent of government school girls, and 30 per cent of government school boys. After the intervention, awareness rose to 67 per cent among private school girls, 70 per cent among private school boys, 73 per cent among government school girls, and 63 per cent among government school boys. Following the intervention program, 53 per cent of private school girls, 57 per cent of private school boys, 47 per cent of government school girls, and 37 per cent of government school boys were aware of the health problems caused by adulterated sugar and salt.

Before the intervention, only 3 per cent of government school boys were aware of the detection methods for adulterated sugar/salt. After the intervention, awareness of detection methods increased to 50 per cent among private school girls, and 47 per cent among boys from both private and government schools.

Gautam and Singh (2016), in their study on awareness of food adulteration, found that the majority of consumers had low awareness scores regarding adulteration in various food items. High awareness scores were reported only for cereals and milk, each by 33 per cent of consumers. None of the consumers had high awareness scores about the harmful effects of adulteration in any food items, and all respondents showed low awareness regarding the harmful effects of adulteration in fats. Almost similar observations were made by Gupta and Panchal. (2009), who conducted an awareness survey in Mahadev village of Gujarat and reported that 15 per cent of the sample had low awareness, 60 per cent had moderate awareness, and 25 per cent had high awareness regarding food adulteration. Similarly, Joshi et al. (2017) revealed in his study that approximately 45 per cent of women were aware that food adulteration is harmful to health.

From Table 7, it is evident that awareness of adulterants in coloured sweets significantly increased after the intervention program. Awareness rose from 3 per cent to 57 per cent among private school girls, from 30 per cent to 43 per cent among private school boys, from 57 per cent to 83 per cent among government school girls, and from 53 per cent to 60 per cent among government school boys.

Before the intervention, only 3 per cent of girls and 7 per cent of boys from private schools were aware of health problems caused by adulterants in coloured sweets. This increased in the post-test to 27 per cent among private school girls, 33 per cent among private school boys, 50 per cent among government school girls, and 47 per cent among government school boys. After the intervention program, 30 per cent of girls and 23 per cent of boys from private schools, and 47 per cent of girls and 33 per cent of boys from government schools, were aware of detection methods for adulterants in coloured sweets. Before the intervention program, only 3 per cent each of private school boys and government school girls were aware of adulterants used in sugar-coated saunf. After the intervention, awareness increased to 37 per cent among private school girls, 57 per cent among private school boys, 43 per cent among government school girls, and 53 per cent among government school boys.

In the pre-test, only 3 per cent of government school girls were aware of both the health problems and detection methods related to adulterated sugar-coated saunf. After the intervention, awareness of health problems increased to 17 per cent each among private school girls and boys, 20 per cent among government school girls, and 53 per cent among government school boys. Regarding detection methods, post-test awareness rose to 13 per cent among private school girls, 17 per cent each among boys from private and government schools, and 20 per cent among government school girls. Before the intervention program, 23 per cent of boys from private schools, 33 per cent of girls, and 30 per cent of boys from government schools were aware of adulterants in ice candy. After the intervention,

awareness increased to 63 per cent of private school girls, 77 per cent of private school boys, 70 per cent of government school girls, and 73 per cent of government school boys. Very few only 10 per cent of private school boys were aware of the health problems caused by adulterated ice candy in the pre-test. After the intervention, awareness rose to 50 per cent each among private school girls and boys, 47 per cent among government school girls, and 40 per cent among government school boys.

In the post-test, awareness of detection methods increased to 23 per cent among private school girls, 37 per cent among private school boys, 33 per cent among government school girls, and 40 per cent among government school boys. In the case of ice candy, the results were supported by Tiwari et al. (2013), whose study revealed that respondents were not significantly aware of the health problems caused by adulterants in ice candy. Moreover, they believed that since ice creams are packaged and sold under popular brand names, the chances of adulteration were minimal. Only 7 per cent of private school boys and 3 per cent of government school boys were aware of adulterants used in halwa during the pre-test. The intervention program increased awareness of adulterants in halwa to 63 per cent among girls from both private and government schools, 73 per cent among private school boys, and 67 per cent among government school boys.

In the pre-test, only 3 per cent of private school boys were aware of the health problems caused by adulterated halwa. This awareness increased in the post-test to 40 per cent of private school girls, 30 per cent of private school boys, 37 per cent of government school girls, and 43 per cent of government school boys. As a result of the intervention program, awareness of detection methods for adulterants in halwa rose to 40 per cent among private school girls, 73 per cent among private school boys, 50 per cent among government school girls, and 37 per cent among government school boys.

Table 7. Distribution of respondents based on awareness on adulterants used, health problems and detection methods in Ready to eat snacks

Ready to eat Snacks	Type of School	Gender	Awareness					
			Adulterants used commonly		Health problems		Detection methods adopted	
			Pre test	Post Test	Pre Test	Post test	Pre Test	Post Test
Coloured sweets	Private School	Girls	1(3)	17(57)	1(3)	8(27)	-	9(30)
		Boys	9(30)	13(43)	2(7)	10(33)	-	7(23)
	Government school	Girls	17(57)	25(83)	-	15(50)	-	14(47)
		boys	16(53)	18(60)	-	14(47)	-	10(33)
Sugar coated saunf	Private School	Girls	-	11(37)	-	5(17)	-	4(13)
		Boys	1(3)	17(57)	-	5(17)	-	5(17)
	Government school	Girls	1(3)	13(43)	1(3)	6(20)	1(3)	6(20)
		Boys	-	16(53)	-	7(23)	-	5(17)
Ice candy	Private School	Girls	-	19(63)	-	15(50)	-	7(23)
		Boys	7(23)	23(77)	3(10)	15(50)	-	11(37)
	Government school	Girls	10(33)	21(70)	-	14(47)	-	10(33)
		Boys	9(30)	22(73)	-	12(40)	-	12(40)
Halwa	Private School	Girls	-	19(63)	-	12(40)	-	12(40)
		Boys	2(7)	22(73)	1(3)	9(30)	-	22(73)
	Government school	Girls	-	19(63)	-	11(37)	-	15(50)
		Boys	1(3)	20(67)	-	13(43)	-	11(37)
Rasgulla	Private School	Girls	4(13)	11(37)	2(7)	2(7)	-	2(7)
		Boys	-	13(43)	-	1(3)	-	3(10)
	Government school	Girls	-	17(57)	-	10(33)	-	5(17)
		Boys	3(10)	15(50)	1(3)	6(20)	-	4(13)

Groundnuts	Private School	Girls	5(17)	19(63)	1(3)	4(13)	1(3)	3(10)
		Boys	2(7)	15(50)	2(7)	1(3)	-	6(20)
	Government school	Girls	6(20)	17(57)	-	11(37)	-	5(17)
		Boys	9(30)	17(57)	-	10(33)	-	7(23)
Burfi	Private School	Girls	2(7)	17(57)	-	2(7)	-	-
		Boys	1(3)	10(33)	-	3(10)	-	3(10)
	Government school	Girls	9(30)	7(23)	-	4(13)	-	4(13)
		Boys	10(33)	14(47)	1(3)	4(13)	1(3)	3(10)
Gulab Jamun	Private School	Girls	-	14(47)	-	3(10)	-	-
		Boys	3(10)	14(47)	-	5(17)	-	3(10)
	Government school	Girls	1(3)	10(33)	-	6(20)	-	1(3)
		Boys	-	12(40)	-	5(17)	-	2(7)
Laddoos	Private School	Girls	3(10)	15(50)	1(3)	8(27)	1(3)	8(27)
		Boys	2(7)	21(70)	-	12(40)	-	9(30)
	Government school	Girls	9(30)	19(63)	2(7)	25(83)	-	15(50)
		boys	10(33)	18(60)	-	11(37)	-	9(30)

(Figures in parenthesis indicate percentage)

Only 13 per cent of private school girls and 10 per cent of government school boys were aware of adulterants used in Rasgulla before the intervention. After the intervention, awareness increased to 37 per cent of private school girls, 43 per cent of private school boys, 57 per cent of government school girls, and 50 per cent of government school boys.

Before the intervention, very few respondents 7 per cent of private school girls and 3 per cent of government school boys were aware of the health problems caused by adulterants in Rasgulla. After the intervention, awareness among private school girls remained the same (7%), while it increased to 10 per cent among private school boys, 33 per cent among government school girls, and 20 per cent among government school boys. The intervention program also improved awareness of detection methods for adulterants in Rasgulla to 7 per cent among private school girls, 10 per cent among private school boys, 17 per cent among government school girls, and 13 per cent among government school boys. The intervention program increased awareness about adulterants used in groundnuts from 17 per cent to 63 per cent among private school girls, from 7 per cent to 50 per cent among private school boys, from 20 per cent to 57 per cent among government school girls, and from 30 per cent to 57 per cent among government school boys. Very few respondents were aware of the health problems caused by adulterated groundnuts in the pre-test only 3 per cent of girls and 7 per cent of boys. In the post-test, awareness rose to 13 per cent of private school girls, 3 per cent of private school boys, 37 per cent of government school girls, and 33 per cent of government school boys. Only 3 per cent of private school girls were aware of detection methods for adulterants in groundnuts in the pre-test. After the intervention, this increased to 10 per cent of girls and 20 per cent of boys in private schools, and to 17 per cent of girls and 23 per cent of boys in government schools.

The intervention program increased the awareness level about adulterants used in Burfi from 7 per cent to 57 per cent among private school girls, and from 3 per cent to 33 per cent among private school boys. Among government school students, awareness changed from 30 per cent to 23 per cent among girls (a slight decrease) and from 33 per cent to 47 per cent among boys. In the pre-test, only 3 per cent of government school boys were aware of the health problems caused by adulterated Burfi. After the intervention, awareness increased to 7 per cent among private school girls, 10 per cent among private school boys, and 13 per cent each among girls and boys from government schools. Regarding detection methods, only 3 per cent of government school boys were aware in the pre-test. Following the intervention, awareness rose to 10 per cent each among private and government school boys, and to 13 per cent among government school girls.

Table 8. Distribution of respondents based on awareness on adulterants used, health problems and detection methods in school respondent's snacks

School respondents snacks	Type of school	Gender	Awareness					
			Adulterants used commonly		Health problems		Detection methods adopted	
			Pre Test	Post Test	Pre test	Post test	Pre Test	Post Test
Jalebis	Private school	Girls	1(3)	13(43)	1(3)	9(30)	-	7(23)
		Boys	3(10)	19(63)	-	13(43)	-	10(33)
	Government school	Girls	7(23)	13(43)	-	12(40)	-	10(33)
		Boys	5(17)	14(47)	-	7(23)	-	6(20)
Pani-puri	Private school	Girls	5(17)	27(90)	5(17)	24(80)	1(3)	22(73)
		Boys	10(30)	25(83)	7(23)	20(67)	2(7)	15(50)
	Government school	Girls	3(10)	14(46)	3(10)	10(33)	1(3)	6(20)
		Boys	4(13)	19(63)	2(7)	16(53)	1(3)	10(33)

(Figures in parenthesis indicate percentage)

From Table 8, it is evident that only 10 per cent of private school boys and 3 per cent of government school girls were aware of adulterants used in Gulab Jamun before the intervention. After the intervention, awareness increased to 47 per cent among both girls and boys from private schools, and to 33 per cent of girls and 40 per cent of boys from government schools. The intervention program also improved awareness of health problems caused by adulterants in Gulab Jamun to 10 per cent of girls and 17 per cent of boys in private schools, and 20 per cent of girls and 17 per cent of boys in government schools.

Regarding detection methods, 10 per cent of private school boys, 3 per cent of government school girls, and 7 per cent of government school boys were aware after the intervention. Regarding adulterants in Laddoos, the intervention program significantly increased the awareness level among respondents from 10 per cent to 50 per cent among private school girls, 7 per cent to 70 per cent among private school boys, 30 per cent to 63 per cent among government school girls, and 33 per cent to 60 per cent among government school boys. Very few only 3 per cent of private school girls and 7 per cent of government school girls were aware of the health problems caused by adulterated Laddoos in the pre-test. This awareness increased in the post-test to 27 per cent of private school girls, 40 per cent of private school boys, 83 per cent of government school girls, and 37 per cent of government school boys.

In the pre-test, the least awareness of detection methods was observed among private school girls. After the intervention, awareness rose to 27 per cent among private school girls, 30 per cent each among boys from private and government schools, and 50 per cent among government school girls. Through the intervention program, awareness about adulterants used in Jalebis increased from 3 per cent to 43 per cent among private school girls, from 10 per cent to 63 per cent among private school boys, from 23 per cent to 43 per cent among government school girls, and from 17 per cent to 47 per cent among government school boys.

In the pre-test, only 3 per cent of private school girls were aware of the health problems caused by adulterated Jalebis. After the intervention, awareness increased to 30 per cent among private school girls, 43 per cent among private school boys, 40 per cent among government school girls, and 23 per cent among government school boys. The intervention program also improved awareness of detection methods for adulterants in Jalebis to 23 per cent among private school girls, 33 per cent each among private school boys and government school girls, and 20 per cent among government school boys.

Nearly 17 per cent of girls and 30 per cent of boys from private schools, and 10 per cent of girls and 13 per cent of boys from government schools were aware of the adulterants used in Pani Puri before the intervention. After the intervention, awareness increased significantly to 90 per cent of private school girls, 83 per cent of private school boys, 46 per cent of government school girls, and 63 per cent of government school boys. In the pre-test, 17 per cent of private school girls, 23 per cent of private school boys, 10 per cent of government school girls, and 7 per cent of government school boys were aware of the health problems caused by adulterated

Pani Puri. After the intervention, awareness increased to 80 per cent among private school girls, 67 per cent among private school boys, 33 per cent among government school girls, and 53 per cent among government school boys.

Regarding detection methods, awareness was very low in the pre-test: only 3 per cent each of girls from private and government schools, 3 per cent of boys from government schools, and 7 per cent of boys from private schools had knowledge. After the intervention, awareness rose to 73 per cent of private school girls, 50 per cent of private school boys, 20 per cent of government school girls, and 33 per cent of government school boys.

Awareness of respondents

To assess the awareness of respondents towards food adulteration, including the concept of food adulteration, commonly used adulterants, and the health problems caused by food adulterants.

Collection and framing of test items

An item pool of awareness questions was prepared by referring to various textbooks and journals on food adulteration. A list of food items was framed in an appropriate format by categorizing them into cereal-based foods, pulse-based foods, milk and milk products, spices and condiments, miscellaneous items, and ready-to-eat foods. This categorization aimed to assess knowledge about the adulterants used, health problems caused by food adulteration, and detection techniques. A pre-test was conducted before the intervention program and a post-test was administered after the intervention, as detailed in the table 8.

Pre-testing

The items for the awareness test were pre-tested by administering them to 9th class students 30 girls and 30 boys each from a private school and a government school. Care was taken to ensure that the students selected for this purpose were not part of the main sample chosen for the study.

Intervention

To educate the respondents on key consumer issues related to food adulteration, a multimedia package was developed and used as part of the impact study.

Post-test

The same group of respondents received educational input through the multimedia package on food adulteration. A post-test was then conducted to assess any change in the respondents' awareness levels.

Mean score

The mean score refers to the average value in a data set, calculated by dividing the sum of all the values by the total number of observations.

Frequency

In statistics, frequency (or absolute frequency) refers to the number of times a specific event or response occurs in a dataset.

Percentage

Percentages were used to standardize the data by representing the number of individuals in a particular category as if the total number of cases were 100.

Paired t-test

A paired t-test was used to compare two population means. This statistical method is appropriate when observations in one sample can be logically paired with observations in the other, as in pre-test and post-test studies.

4. CONCLUSION

The majority of students initially exhibited low to medium levels of awareness regarding food adulterants and the associated health problems, and were least aware of detection methods. However, significant improvement was observed, particularly in their knowledge about adulterants used in various food items and detection techniques, following the educational intervention. The calculated t-statistic was 32.63*, which is significant at the 0.05 level of probability, indicating a statistically significant difference between the pre-test and post-test scores.

Informed consent

Written & Oral informed consent was obtained from individual participants included in the study.

Funding

This study has not received any external funding.

Ethical approval

In this article, the product ethical regulations are followed as per the ethical committee guidelines of College of Community Science, Department of Resource Management and Consumer Science, India; the authors observed the Student Awareness and Impact of Intervention Regarding Food Adulteration. The “brand name” of the product is not mentioned in content and also the “brand image” not displayed as figure in the article. The product ethical guidelines are followed in the study for observation, identification & experimentation.

Conflict of Interest

The author declares that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

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