

Effect of Nutrition Education Regarding Food Safety and Hygiene on Knowledge, Attitude and Practice (KAP) of Street Beverage Vendors of South Delhi

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Abstract

This study analyses the Knowledge, Attitude, Practice (KAP) and Observation regarding hygiene, safety and handling of food and to assess the effect of nutrition education (with developed aids) on street beverage vendors (SBV, n =100). It was a randomized control trial in which street beverage vendors of Delhi, India was included. The SBV were divided into a control group (CG), n=50 (did not receive any nutrition education) and experimental group (EG), n=50. Nutrition education was given with the developed aids to the EG only. After one- month of intervention KAP was assessed again for both the groups. Results revealed Knowledge score was 10.90±3.85 (poor), Attitude score was -6.44±5.65 (poor) Practice score was 8.47± 2.58 (poor) and observation score was 16.46± 4.74 (poor) of all SBV. At baseline both the groups (CG and EG) were comparable. Post nutrition education results showed an increase in the Knowledge of the EG (11.96 vs. 17.80, p=<0.01), the Attitude (-6.60 vs. 28.1±0.93, p=<0.01), Practice (9.22 vs. 18.62, p=<0.01) and observation (14.88 vs. 28.28, p=<0.01). The study concludes that KAP and Observation assessment scores were unsatisfactory, most of the vendors fell under the category of fair to poor scores. After the nutrition education program, the experimental group scored as compared to the control group.

Keywords: Street, Beverage, Vendors, Knowledge, Attitude, Practice, Observation, Food Safety, Hygiene.

Introduction

Street food (SF) and beverages are ready-to-eat food items prepared and sold by vendors in different public places, especially in streets, railway stations, market areas and near bus stands. Street food can be defined as “Street food is ready-to-eat food or drink sold on street or other public places by hawker or vendor (Simopoulos & Bhat, 2000)”. The Food and Agricultural Organization (FAO) of the United Nations defines Street food as “ready-to-eat foods and beverages sold by vendors and Foods beverages prepared and/or sold by vendors and hawkers especially in streets and other similar public places” (FAO, 1988). Street foods have been a vast global business in many communities in the world since ancient times. Many countries have experienced a rapid growth of this sector because of socio-economic changes. Street food vending is prevalent in urban areas of developing countries (Solomons, N. W. et.al, 1995; Chakravarty I,1996).According to the Food and Agricultural Organization access to safe and nutritious food is a basic human right and contamination of food with noxious agents (biological, chemical and physical) poses a great threat to human

health and the resultant problems and issues related to the safety of food are ever increasing. Street vendors selling food are often poor, uneducated and untrained. They are often ignorant about food hygiene, which are the conditions and measures necessary to ensure the safety of food from production to consumption. Lack of adequate food hygiene can lead to food-borne illnesses due to improper food handling Practice and in extreme events, even death of customers (WHO, 2015). Vendors are trainable in food hygiene, if they are given the Knowledge on food hygiene and safety (Chakravarty I, 1996; Von Holy A, et al. 2006; World Health Organization, 1996). Food safety education is more effective if the messages are targeted towards the specific audience (Edwards PK, et al. 1986). Training and education of street food vendors is one of the most effective interventions to assure the safety of street foods. The training of vendors in simple food handling practices has also been touted as a measure to improve food safety and hygiene.

Lewis, J. E., *et al.*, (2006), reported that, based on standard techniques (e.g., culturing on selective media), freshly squeezed juices in a metropolitan city (Visakhapatnam) in south India remained hygienically poor in most localities because bacterial loads (Total viable counts and Total coliforms) on the whole were abnormally high. Based on the presence of faecal coliforms and faecal streptococci, it is concluded that fruit juices in certain areas of the city (e.g., R.T.C. Complex, Fishermen's colony, Vegetable market) are highly infected and unfit for human consumption and Tambekar DH et al., (2011) reported that 93% of Pani Puri water samples had high loads of bacterial pathogens such as *Escherichia coli* (41%), *Staphylococcus aureus* (31%), *Klebsiella sp.* (20%), *Pseudomonas sp.* (5%), and yeast (3%). It is suggested that regular monitoring of the quality of street foods be conducted in the future to avoid food-borne infection.

Every day, approximately 2.5 billion people worldwide consume street food (Fellows, P., & Hilmi, M, 2011). Because of the health and nutritional benefits, a large population of all income and age groups consumes freshly squeezed fruit and vegetable juice in developing countries such as India, particularly in metropolitan and other cities. The juices are also said to have therapeutic properties in some physiological ailments, allowing for faster recovery. Street vendors sell the majority of fruit juices such as a pineapple, sweet lime, an orange, and others, as well as vegetable juices such as a carrot, spinach, wheatgrass, cucumber, and bottle gourd.

The World Health Organization (WHO) reported that food-borne diseases have a significant impact on both developed and developing countries' health and economic growth (WHO, 2013). Every year, food- and water borne diarrhoea outbreaks kill nearly 2.2 million people worldwide, according to the WHO. Food-borne illnesses can cause serious complications such as kidney and liver failure, brain and neural disorders, reactive arthritis, cancer, and death, in addition to diarrhoea (WHO, 2013). As a result, the causes of food-borne outbreaks must be thoroughly investigated in an order to prevent these outbreaks (CDC, 2011). Several studies on the Knowledge and Practices of street vendors' food safety standards conducted in different countries have revealed a gap between Knowledge of food hygiene and handling Practices (Omemu, A. M., et al., 2008). All of these findings suggest that studies to assess Knowledge and Practice (KP) are required to evaluate street food vendors and educate them. Several studies on the Knowledge and Practices of street vendors' food safety standards conducted in different countries have revealed a gap between Knowledge of food hygiene and handling Practices (Omemu, A. M., et al., 2008). Literature review suggests that studies to assess Knowledge and Practice are required to evaluate street food vendors and educate them. Hence the present study was undertaken to evaluate the effect of 1 month nutrition education regarding food safety and hygiene on KAP of SBV compared to the control group.

Methods

Period and duration of the study: Nine months between March 2022 to December 2022

Study design: Randomized control trial- two-arm, parallel group

Study locale: South Delhi district of Delhi, India namely: Shaheen Bagh, Kalkaji, Pehlampur, Bhogal, Alaknanda, Greater Kailash and Nehru Place.

Study subjects: Street beverage vendors (SVB) (n= 100)
The study subjects were apprised of the purpose of the study and consent was obtained.

The **inclusion criteria** for the study were:

- All genders
 - Above the age of 18 years
 - Regular availability at vending areas
 - Who consented to participate in the study
- The **Exclusion criteria** were:
- Vendors outside the selected region of the study.
 - Vendors selling beverages other than these beverage groups (juices, milkshakes, *shikanji*, *jaljira* and *sharbat*).

To collect data, a proforma was developed for assessment of socio demographic profile. The SBV socio demographic profile included: age, gender, income, educational level, occupation, marital status, place of residence, type and size of family, and socioeconomic status. The socioeconomic status was assessed by using Kuppuswamy socio-economic scale 2020. To assess knowledge, attitude and practice regarding food handling, hygiene and safety and a checklist for observation a questionnaire was developed by the researcher.

Table 14: KAP questionnaire format

Parameters	Knowledge (K)	Attitude (A)	Practice (P)	Observation (O)
No. of items	questionnaire,24	questionnaire15	questionnaire,22	Checklist,32
Options with scores	Yes:1 No:0 Don't know:0	Strongly agree: 2 Agree: 1 Neutral: 0 Disagree: -1 Strongly disagree: -2	Yes:1, No:0 Don't know:0	Yes:1 No: 0
Total Scoring(max.-min.)	24 – 0	30 - -30	22 – 0	32 - 0
Score % of each respondent	$\frac{\text{Score of K/A/P/O} \times 100}{\text{maximum score}}$			
Categories of scores	GOOD>	FAIR	POOR	
Score (%)	70%	50% - 70%	<50%	

Table 14 shows the format of the KAP questionnaire and its scoring. A face-to-face interview technique was used to collect information on the proforma. Pretesting of proforma was done on 20 SBV (were not included in study), necessary change after pre-testing was done. The SBV were asked questions (by the researcher) based on their feasibility and comfort, after assuring them that their data was confidential.

Development of Nutritional Education Intervention Program

To highlight the importance of hygiene and safe food handling to street beverage vendors the nutrition education program was developed. Aids were developed on personal hygiene, handling, safety, hygiene and cross-contamination of street foods and street vendors. The aids developed were:

- A. Brochure: Importance of cleaning, cleaning of preparation area, clothes, cleaning of utensils, cleaning of dustbin, separation of garbage and pest and insect control.
- B. Presentation video on: (i) Food handling, and (ii) personal hygiene
Food Handling: information about contamination, separation of perishable and nonperishable, preparations needed before starting the process of preparing beverages, cleaning of raw material containers and storage, contamination: while buying of raw material, cleaning/ washing of raw material, storage of raw material and serving of beverages.
Personal hygiene: definition of healthy SBV, information about personal hygiene.
- C. Quiz game: consists of water guidelines, clean water importance, importance of clean and hygienic water.

Randomization technique

Vendors were randomized into two groups; Intervention (N= 50) and Control (N= 50) based on computer generated random numbers.

Duration of intervention

A nutritional education program was conducted once a week for a month with each session of 45 minutes to the experimental group. Control group did not receive any education. Assessment time points: KAP and observation checklist was assessed at baseline and after one month for both the groups.

Statistical analysis

The study questionnaire data was entered into Excel spreadsheets. All the statistical analysis was done using the SPSS version 20. Qualitative data was analysed using summary statistics such as frequencies, percentages. The quantitative data was expressed as mean, standard deviation, minimum and maximum scores (knowledge, attitude, practice and observation) were calculated and expressed as a percentage. Independent t-test was used to compare the scores between two groups and paired t-test was used to compare scores within the groups, ANOVA was applied to test between categorical independent variable (gender) and quantitative dependent variable (KAP scores) and correlation was used to assess the relationship between two quantitative variables. The correlation test was between the variables: Knowledge score, Attitude score, Practice score, observation score, age and education. Statistical significance was considered at $p < 0.05$.

Results

Table 15: Socio demographic profile of study participants (SBV, n=100)

Gender	Male	68
	Female	28
	Others (Transgender)	4
Age in years	18-25	36
	26-50	53
	50-60	11
Age (Mean±SD)	33.64±10.49	
Education qualification	Below 8th class	28
	8th class- 10th class	52
	11th class -12th class	20
Migrant	Yes	47
	No	53
Type of family	Joint	21
	Nuclear	79
Own house	Yes	62
	No	38
No. of family members	1-4	51
	5-8	49
Married	Yes	81
	No	19
No. of working family members	1-2	71
	3-5	29
Working experience as vendor (In years)	1-4	2
	5-10	57
	11-15	37
	>15	4
No. of stalls owned	> 1	36
	1	64
History of any medical condition	Yes	69
	No	31
Is shop connected online	Yes	30
	No	70
Socio economic status	Lower Middle	50.1
	Upper Lower	49.9

Table 15 depicts the socio- demographic profile of study subjects. A total of 100 street beverage vendors with mean age 33.64 ± 10.49 years were included in the study. Their maximum education qualification was 11th to 12th grade and 52% of them were educated from 8th to 10th grade only. Only a few of them had more than 15 years of working experience, whereas the majority of them fell into the category of 5 to 10 years of working experience. Surprisingly, 88% of them did not have the FSSAI license while they were working in the food industry.

Table 16: Distribution of SBV according to their knowledge score

Category	Score of Knowledge tool (min-max)	Knowledge score of SBV (min- max)	N=100	Knowledge score Mean \pm SD(min- max)
Good (>70 %)	18 -24	18 – 20	4	10.90 \pm 3.85 (3-20)
Fair (50 - 70%)	12 – 17	12 – 16	42	
Poor (<50%)	0 – 11	3 – 11	54	

Table 16 shows that the majority of respondents have fair to poor knowledge regarding personal hygiene, handling, and safety, with only 4% of respondents having good knowledge.

Table 17: Distribution of SBV according to their Attitude score

Category	Score of Attitude tool (min-max)	Attitude Score of SBV (min- max)	N=100	Attitude score of Mean \pm SD(min- max)
Good (>70 %)	16 -30	–	0	-6.44 \pm 5.65 (-18 to 10)
Fair (50 - 70%)	1 – 15	1 – 10	10	
Poor (<50%)	-30 – 0	-18 – 0	90	

Table 17 depicts 90% of SBV have poor attitude towards personal hygiene, handling and safety.

Table 18: Distribution of SBV according to their Practice score

Category	PracticeScore (min-max)	SBVPractice score (Min-max)	N=100	Practice score Mean \pm SD(min- max)
Good (>70 %)	17 -22	–	0	8.47 \pm 2.58 (4 - 15)
Fair (50 - 70%)	11 – 16	11 – 15	21	
Poor (<50%)	0 – 10	4 – 10	79	

Table 18 presents ,3/4th of SBV have fair to poor practice towards personal hygiene, handling and safety. Also, none of the SBV came under the category of good practice score.

Table 19: Distribution of SBV according to their Observation score

Category	Observation Score tool (min-max)	SBV Observation (min- max)	N=100	Observation score Mean ±SD (min- max)
Good (>70 %)	22 -29	22 – 29	13	16.46± 4.74 (5 - 29)
Fair (50 - 70%)	17 – 21	17 – 21	35	
Poor (<50%)	<16	5 – 16	52	

The findings of Table 19. shows majority of respondents have fair to poor observation scores regarding personal hygiene, handling and safety. Correlation between knowledge, attitude, practice, observation, age, and education. The findings show a correlation between Knowledge and observation ($r=.472^{**}$), ($p < .01$).The mean and standard deviation of Knowledge score was not different among the three genders ($p = 0.84$).

Table 20: Pre and Post assessment within and between group (control & experimental)

Parameters	Groups	N	Mean±SD	Between group P- value	Within group p- value
PRE-Assessment					Control group
Knowledge Score	a. CG	50	10.47±3.68	0.95	a & I 0.44
	b. EG	50	11.96±3.24		
Attitude Score	c. CG	50	-6.28±5.96	0.77	c & k 0.19
	d. EG	50	-6.60±5.38		
Practice Score	e. CG	50	10.12±3.49	0.18	e & m 0.17
	f. EG	50	9.22±3.24		
Observation Score	g. CG	50	10.66±2.49	0.28	g & o 0.36
	h. EG	50	14.88±3.65		
POST-Assessment					Experimental group
Knowledge Score	i. CG	50	10.30±2.03	<0.01	b & j <0.01
	j. EG	50	17.80±4.40		
Attitude Score	k. CG	50	-6.32±7.80	<0.01	d & l <0.01
	l. EG	50	28.66±3.24		
Practice Score	m. CG	50	10.80±2.82	<0.01	f & n <0.01
	n. EG	50	18.62±5.83		
Observation Score	o. CG	50	10.60±2.49	<0.01	h & p <0.01
	p. EG	50	28.28±7.03		

Table 20 depicts the KAP and observation score of the two groups pre and post intervention. At baseline KAP and observation score was similar in the two groups. After intervention of nutritional education, KAP and observation scores of the experimental group increased significantly. The control group KAP and observation were similar and observation score of the two groups pre and post intervention. At baseline KAP and observation score was similar in the two groups. After intervention of nutritional education, KAP and observation scores of the experimental group increased significantly. The control group KAP and observation were similar.

Discussion

The SBV appears to be an important part of developing societies such as India society, as they support the livelihoods of millions of urban poor people. Traditional and exotic street foods and beverages from the local culture have become a growing tourist hotspot in developing nations. However, the recent rise in outbreaks of food-borne diseases in developing nations has made street beverages one of the most prevalent risks in this category. According to Rane (2011), the poor Knowledge and improper food handling of street vendors in basic food safety measures, as well as consumers' lack of Knowledge and awareness of the potential hazards associated with certain foods, could explain the health and safety issues that street foods may pose.

The present study shows the KAP score of SBV regarding safety, hygiene and handling. The mean age of the study subject, in the current study the mean of the age was 33.64 ± 10.49 whereas the study conducted by Singh Singh, A. K., Dudeja, (2016) mean age was 35 ± 13.2 years. Therefore, I can say that, the mean age was similar in both the studies. In this study 53% SBV were into a broader age range (25 to 50) years old. Which was surprisingly similar to studies in Ghana (Money et al., 2014) and India (Bhowmik & Saha, 2012), with around 70% each of their vendors also belonging to the same age range (25-50).

As per reported data in other countries such as Brazil (Samapundo, S., Hanashiro et al., 2005), Nigeria (Omemu, A. M., 2008), and Zimbabwe (Gadaga et al., 2008), where females were 56.6%, 66%, 78%, and 81%, respectively, but was consistent with the results of previous two studies in India where males were 70% and 93.0%. (Bhowmik & Saha, 2012; Singh et al., 2017; Thakur & Singh, 2018) which was the same case in the current study. In this study males were 68% and females 28%. According to the data of the other countries where females hold a good number of percentages, though in India the number of female SBV was not like other countries. This could be due to their role as traditional householder or mother's roles or because it is field work and the SBV stalkers need to move or resettle or because they have to beat with light from the sun, dust, and environmental damage. It might also be because it is field work and the SBV stalkers need to move or rearrange. The difference between this study and others was that in this study 4% were trans people.

The licensed SBV of the current study was 22%, whereas as per the Thakur & Singh et.al, 2013 study there was none of the vendor was licensed. This might be due to their knowledge and awareness of the social media regarding FSSAI, or might be their education. According to the current study's data, only 36% of the SBV had clean nails, whereas (Thakur and Meenakshi et al, 2013) reported 72% had short clean nails. That was truly surprising. This could be due to their carelessness for personal hygiene.

The study by Kapoor et al., 2019 found that the prevalence of smokers among street food vendors was 68.5%. Nicotine and other harmful heavy metals will accumulate on the open food and beverages at the time of smoking by vendors, which can then present significant

health risks to customers, such as coronary heart disease (Barnoya, J., & Glantz, 2004). Whereas per the current study 53% SBV had the prevalence of smoker's tobacco and pan chewing, which was almost the same and again they did it because of their carelessness for personal hygiene. According to Thakur et al. (2013), only 2% of SBV washes their hands before and after handling, according to the data from current study, 35% of SBV washes their hands before and after handling and only 44% washes them before using the toilet facilities. Although it is a progress of over 2%, it is still unsatisfactory that only 33% of SBV washes their hands before and after handling out of 100% of SBV.

This might be because their awareness increased or their groups or maybe they had some training or maybe from gaining Knowledge from social media. Only 35% wash their before and after and only 44% before toilet visit. This was a very unhygienic and wrong Practice among the food vendors. Similar findings have been documented by Muinde et al. It was observed that 52% vending sites were not protected from sunshine, dust and insects and Thakur et al., 2013, reported Presence of flies/mosquitoes was observed in 45% of the vending sites. In this study SBV Knowledge score of the street beverage vendors was 10.90 ± 3.85 (poor), which was due to their lack of Knowledge because only 4% of the SBV were able to score good Knowledge score 10.90 ± 3.85 (poor), -6.44 ± 5.65 (poor) because none of the SBV scored good Attitude score, Practice score was 8.47 ± 2.58 (poor) due to only 4% were able to score good Practice score and observation score was 16.46 ± 4.74 (poor). In that case 13% were good observational scores.

According to the results of the current study, Knowledge and Attitude had weakly ($r = .198$) weakly statistically significant correlation. Therefore, it cannot be said that as Knowledge increases, so too does SBV's Attitude. As observed in our study, Knowledge and the observation of good field Practice were positively and significantly correlated. This was a fair correlation, and it can be said that as SBV Knowledge grows, good field Practice will increasingly be seen. The correlation between Attitude and observation was also positively significant, despite the fact that it was a fair correlation. It is therefore possible to say that as the Attitude towards personal hygiene, handling, and safety increases, good field Practice can be observed. Although! it was surprising to observe the correlation between Knowledge and observation of good field Practice, because there was no correlation noted between observation and Practice or Knowledge and Practice. This might happen due to the fact that although the interview was taken in their comfort timings but may be due to hesitation or may be in fear and due to their loss of interest there might be chances that they didn't answer properly about the Practice questionnaire.

Conclusion

It can be concluded from the study that KAP and Observation assessment scores were unsatisfactory; most of the vendors fell under the category of fair to poor scores. The street beverage vendors were not well educated which is reflected in their Knowledge, Attitude and Practices. Even 88% were not FSSAI licensed and its ill effects were seen in their largely inadequate and unhygienic practices during the vending of the beverage. After a one-month nutrition education program the experimental group scored better under the category of KAP and observation as compared to the control group.

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