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Educational Program on Safety Food Measures among Primary School Students

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Abstract: *Food safety is an increasingly important public health issue. Governments all over the world are intensifying their efforts to improve food safety.* ***The aim*** *was to evaluate the effect of educational program on safety food measurs among primary school students.* ***Design****: a quasi- experimental design was used.* ***Setting:*** *This study conducted in all EzbetElwalda primary school at Helwan district in Cairo Government .****Sample****: A stratified multi-stage cluster random sample of 152 students , 6th grade primary schools students was recruited. Tools: Two tools were used for data collection in this study ;* ***1st tool*** *:An interviewing questionnaire to collect data about socio-demographic characteristics of students, past medical history in addition to assessment of students' knowledge and practiceabout safety food* ***2nd tool*** *: observational checklist to assess student hand washing practice and habits assessment as stated* ***Results****: the study denoted that there was a highly statistical significant improvement in the students' satisfactory knowledge regarding safety food measure ,it improvedat the immediate post educational program, than that of follow-up and preprogram 40% , 95% and 83% respectively , (P<0.001) also there were significant improvement in student practice and habits regarding safety food measures in the post and follow up program.****Conclusion****: There wasimprovement in students' knowledge, practice and habits regarding food safety with statistical significant differences after the implementation of the program.* ***Recommendation****: continuous educational program regarding safety food measures can be conduct at primary school student . As well, future researches should be conducted at different level of primary school student .*

Key words: food safety, primary school , knowledge, practice and habits

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I. Introduction

Food safety concept has been emerged in the last decades as a scientific discipline concerning the handling, processing, storage, and packaging of food in order to prevent food-borne illness, A significant proportion of it was attributable to improper food processing practice, preparation, storage, lack of personal hygiene and food safety measures.[1]

Effective food safety educational program implemented in schools should be an important way to reach children and to improve their knowledge and habits in the context of food handling and personal hygiene.[2]Additionally, Learning about food safety in schools makes it possible to influence children behavior with systemic measures. Effective way of children education can act also as facilitators at home through messages conveyed to family members.[3]

Unsafe food containing harmful bacteria, viruses, parasites or chemical substances, causes more than 200 diseases - ranging from diarrhea to cancers. Food-borne and water-borne diarrheal diseases kill an estimated 2 million people annually, including children. Unsafe food creates a cruel cycle of disease and malnutrition.[4]Almost one third of people in the developed countries have an infection caused by foods. In less developed countries, diarrheal diseases transmitted through water and foods are major causes of morbidity and mortality. They cause about 2.2 million deaths per year especially in school children.[5]

Schools play an important role in improving the dietary and physical activity behaviors of children. In addition to it establishes a safe and supportive environment with policies and practices which support the healthy behaviors. Schools also provide opportunities for children to learn practice healthy eating and physical activity behaviors by developing the necessary skills required.[6]

With the beginning of school ages, factors such as teachers, school authorities, and peers play significant role in children's choosing of the eating materials and forming their eating habits. Out of these factors at school environment, the child's peers play a very important role in forming his/her eating habits. School is a

suitable- place for health education, and the children need sufficient knowledge, practice and values for their health promotion.[7]

School health nurse play a vital role as she facilitate positive student responses to normal growth and development; promote their health and safety; intervene with their actual and potential health conditions; provide services for case management; and actively collaborate with others to build student and family capacity for adaptation, self-management, self-advocacy, and education.[8]

Additionally, school nurses play an essential role in keeping children healthy, safe, and ready to learn and employ primary prevention by providing health education that promotes physical and mental health and informs healthcare decisions, prevents disease, and enhances school performance. Addressing such topics as healthy lifestyles, adequate safe food, risk reducing behaviors, developmental needs, activities of daily living, and One of the primary prevention roles of the school nurse is student health promotion and diseaseprevention.[9]

1.1 Significance of the Study

Food-borne diseases remain a major public health problem across the globe. The problem is more severe in developing countries because of lack of personal hygiene and food safety measures. As much as 70% of diarrheal diseases in developing countries are believed to be of food-borne origin.[10]

According to the Egyptian central agency for public mobilization and statistics (CAMPS), total students number in general primary education were 12% of total population.Primary school student are a major at-risk group for contracting microbial food-borne illnesses; roughly half of the reported cases of food-borne illnesses occur in children, with the majority occurring in children under 15 years of age. Effective food safety education program implemented in schools should be an important way to reach children and to improve their knowledge and habits in the context of food handling and personalhygiene.[11]

Different studies have demonstrated that three key factors have a major role in food poisoning including knowledge, practice and habits of consumers as well as food producers.[2]

1.2 Aim of the study

The aim of the current study was to Evaluate the effect of educational program on safety food measures among primary school students through:

1-Assessing student knowledge, practices and habits regarding safety food measures to detect their needs.
2-Planning and implementing educational program according to their needs.
3-Evaluating the effect of educational program on safety food measures primary school students.

1.3 Research Hypothesis:

Educational program on safety food measures among primary school students will improve students' knowledge, practices and habits towards food safety measures.

II. Subjects and methods

2.1 Research design:

A quasi- experimental design used in carrying out this study .

2.2 Research setting:

The study was conducted in all primary schools of EzbetElwaldaHelwan district affiliated to Cairo governorate; there were three primary schools; (NageebMahfoth ,Osama ben Zied and Assmaa bent Aby baker school) .

2.3Subjects:

The subjects of the existing study were 152 student. One class from each school has been chosen randomly (54 students from NageebMahfoth primary school, 52 students from Osama Ben Ziedprimary school, and 46 students from Assmaa Bent Abo Baker primary school). According to inclusion criteria ,free from any health problem and chronic disease in student.

2.3 Sampling technique:

A stratified multi-stage cluster random sample was used in this study All 6th grade primary schools students of EzbetElwalda at Helwan district. About 563 were the totalnumber of the students attending during academic year 2015- 2016.

2.5 Tools of data collection

Tool I: A structural interviewing questionnaire developed by the investigator after reviewing the national and international related literature. This tool contains 4 parts;

a-Concerned with student socio-demographic characteristics related to variables such as age, sex, parent level of education ,place of residence ……etc

b-The past a medical history to collect data about disease related to food borne such as diarrhea, colic, vomiting ….etc

c-knowledge assessment tool designed by the researcher to assess student food safety knowledge as hand washing before eating, ensure safety condition of student packed lunch, ……etc . It was consists of three items.

1. Knowledge about types of food (row or cocked), meaning of food safety and knowledge about food born disease.

2. Prevent contaminating foodwith pathogens spreading from people, pets, and pests.

3. Safety food measures as hand washing ,handling food ……etc

Scoring system: All questions that concerned with knowledge were categorized into two levels as follows: Correct answer scored (1) and wrong answer or don't know scored (0). Total knowledge scored (satisfactory knowledge ≥ 50% and un satisfactory knowledge was ≤ 50%. Question 20 to 54.

d- Student practices as stated by the student regarding food safety as hand washing before eating, and baying food from street vendors.…etc .

All questions that concerned with practices were categorized into Likert Scale (Usually = 3, Sometime =2 and Rare = 1). It includes questions from 49 to 58 .safely practice was ≥ 50% and un safely practice was ≤ 50%.

Tool II

a- Observational check list: to assess students hand washing practice as rains under clean running eater ,dray well with clean twol …etc .

Scoring system: The total scores for student's observational check list were categorized into three levels as follows: perfect Done scored (2) un perfect Done scored(1) , not done (0) and Total habits scored (healthy practice ≥ 50, practice habits <50%..

b-Students habits regarding food safety as content of school bag ,packed lunch box condition ,type of food brought from home can be kept safe(food packaging materials , proper temperature , clean bottle of water …etc .

Scoring system: The total scores for student's habits were categorized into three levels as follows: Scale (Usually = 3, Sometime =2 and Rare = 1). healthy habits was ≥ 50% and un healthy habits was ≤ 50%.

2.6 Pilot study

A pilot study was conducted on 16 students, constituting 10% of (152) the total study sample. To ensure the clarity of questions, applicability of the tools, the time needed to complete them and perform the required modifications according to the available resources. No detection for difficulties was arisen, no omission or addition for items were carried out. Subjects who shared in the pilot study were included from the main study sample.

2.7 Fieldwork

An official permission including the title and purpose of the study submitted from the Dean of the faculty of nursing, Helwan University to get an approval from Central Agency for Mobilization and Statistics for data collection to conduct the study that forwarded to EzbetElwalda primary schools at Helwan district where the study was conducted.

After obtaining a permit the researchers met the students and explain the aim and program contents .

The study work was carried out at January 2016 and completed in Jun 2016. The study conducted The researchers entered to 6th grade primary schools students of EzbetElwalda at Helwan explained the purpose of the study to students who agreed to participatein the study.

The theoretical sessions of the program conducted in the students classes of each school which was clean, well ventilated, wide enough and away from the noise. The clinical sessions were conducted in the school lab as the researchers divided the sample into twelve groups. For collecting data from 152 students, it lasted only one week to fulfilled before the implementation of the educational program. The evaluation phase occurred immediately after the program and after two months to assess the effect of educational program.

The educational program construction. Contained 3 phases:

Phase I: Preparatory phase was done by using the assessment tools after being revised and tested for students' knowledge , practice and habits about food safety measures .

Phase II: Developing and implementing the program. The general objective of the program was to improve the students knowledge and practice about safety food measures. The program contents covered the following major areas; general information about the meaning of food , types of food , safety food ,causes of food contamination and safety food measures . In this phase; the researchers analyze the pre-test then tailored the educational

program to the needs of each student and immediately did the post-test. There was a commonality among all students needs from the educational program. Where there was lack of knowledge on almost all items and need for improvement of their knowledge and practice regarding safety food consuming, the researchers implemented the educational program followed by the immediate post-test. The methodsused were; lectures, discussions, brainstorming, demonstration, and re-demonstration. A booklet containing the knowledge needed to be provided as meaning of safetyfood , causes ofcontamination food , food-borne illness and safety food measures as hand washing ,avoid buying food from street vender and lunch box content .

Phase III: Evaluation was done to measure their improvement through the difference between pre-post test and follow-up test

2.8Ethical considerations:

An ethical approval obtained from the Scientific, Ethical Committee of Nursing Faculty at Helwan University. Additionally, oral consent form regarding agreement from the participant in the study was taken after explaining the objective of the study to them. As well, they were assuredthat anonymity and confidentiality guaranteed and the right to withdraw from the study at any time.

2.9Data management:

Data entry and statistical analysis were performed using personal computer software, the statistical package for social sciences (SPSS), version 14. Suitable descriptive statistics were used such as; frequency, percentage, median, range, mean and standard deviation. Chi–square test was used to detect the relation between the variables. In addition, the correlation coefficient (r) test was used to estimate the closeness association between variables. Paired (t) test was used to compare mean score between both studied variables. The p-value considered the degree of significant and using the correlation (r) test.

III. Results

From the current study**Table (1)**displays that 54.6% of the studied sample age was 11 years old, 45.4 % of them were 12 years old, and the mean age was 11.43± 0.50 years old. As well 50.7% were females & 97.4% were live in urban area. As regards to level of their parents' education 45.4% of fathers and mothers were read and write. Whereas 45.4% of fathers were governmental employees while 57.9% of mothers were housewives.

Regarding distribution of thestudents according to past history **Table (2)** illustrates that the past medical history in the last months. 44.1% of the studied sample had history of vomiting after food during the last year, followed by history of diarrhea after to food in about 26.3% had a history of hospital admissions as a result of contaminated food during.

According to research hypothesis which confirmed that the educational program on safety food measures among primary School students will improve students' knowledge, practices and habits towards food safety measures**Figure (1)** illustrated that there was highly statistical significant improvement in the students satisfactory knowledge regarding safety food measures at the post educational program-test, compare to pre and follow-up test $p < 0.001$.And according to effect of the educational program on students practices **Figure (2)**reveals that there was a highly statistical significant improvement, of students' safely practices as reported .And for the effect of educational program on students habits' regarding safety food measures**Figure (3)**indicates that there was a highly statistical significant improvement of all items of students habits regarding content of school bag.

Table (3) shows that students total knowledge was significantly correlated with safety food measures at pre, post and follow up program (p=0.03).alsostudent total practices were correlated with safety food measures at pre, post and follow up program (p>0.05). Likewise, student's habits were correlated with safety food measures at pre and follow up program (p>0.05). but correlated at post program (p=0.02).

IV. Discussion

Global occurrence of food-borne illnesses is one of public health concern especially in developing about 2.2 million school age children die of diarrhea annually as a result of poor hygiene, lack of potable drinking water, contaminated inappropriate food storage facilities and lack of food safety education .[12] As yet, there is still relatively little public and researcher concern about safety food measurers. So, this study will offer a window about safety food measures among primary school age students. The first part of this present study devotes the demographic characteristics of school students'. The current study showed that the highest percentages of studied sample, their age was 11 years and mean age group 11.43± 0.50. More than half of this current studied sample were females.

The same finding was supported by **Zhou et al.,**[13] Who study food safety among primary school in china and found that mean age of the studied students sample was 11.46 ± 3.80. The aged 12 years were 40.07 % followed by 11 years were 33 %, while the aged 10 years recorded the lowest percentage which was 26.94%.

This could reflect that the target studied was really at risk group as many studies have looked for the same target. And for student's place of residence, the current study findings revealed that the majority of studied sample place of residence were urban. This was congruent with **Ovca (2014)**[3]who study Food safety awareness, among primary school students in Slovenia and found that most of the studied sample 72.7% were live in urban .Conversely, Zh**ou et al**. [13], who conduct educational program about food safety among Chinas primary school student reported that 66.7% of the studied sample participants were living in rural and 33.3% were living in urban areas. This similarities and differences from the researchers point of view may be due some ecological factors contributes in this wide spread of this problem among this target in both urban and rural areas.

As regards to students' Mother's educational level the present study result shows that more than one third of the sample their mother were read and write while the minority had high education.

This result were congruent with **Shen , 2015**[14], Who apply Food safety education among primary school students in China and reported that 34.8% of the student mothers were completed Primary school education or illiterate while 42.4% had completed preparatory school and only 11.4% of them had completed higher secondary education ,This difference from the researcher point of view could be bake to the fact that parent level of education .

Furthermore, the results of present study indicated that more than half of student mothers' occupations were house wife. This results were incongruent with **Kim , 2013**[15]who study The effects of food safety education among elementary school student in Korea reported that 47 % of student mother were house wife While 53% of them were working. These differences may be due to different cultures.

Concerning economic status the studied sample; results revealed that above three quarter of the studied sample family monthly income was enough. This result disagrees with the results of **Helal**[16], who study health needs and problems related to food hygiene among Egyptian primary school and, reported that above two third of the studied sample there family income were enough only for necessary living. These huge differences may be due to different occupation, educational level and different socioeconomic standers.

As regards to students past medical history current study reported that more than one third of the studied sample had history of vomiting after eating meals within the last month, this comes in agree with **Gaw**ai[17], who study hand washing among Indian primary school children and reported that more than half of his studied sample had a history of illnesses since the last month. This from the researchers point of view confirmed the close relation between food-borne diseases and poor food safety practices.

As well, The current study reported the history of diarrhea was more than one quarter and one eighth reported for family member hospital admissions regarding food borne disease. This was in agreement with **Seyum**[18], who studied hand washing among Ethiopian primary school and found students' medical diagnose with diarrhea was 59% and 16.3% for their family members. This may confirm the close relation of the past medical history and unsafely food practices.

Part II: educational program:

According to the effect of education program, the current study showed that The current study showed that there were statistical significant difference in the student satisfactory knowledge regarding meaning of food and food safety meaning , it increased at the immediate post educational program, than that of follow-up and pre program ($P<0.001$) .This finding was supported by **Faccio**[2], who study Food safety knowledge among Italian primary school students and his results postulated that that there were increased in student knowledge with statistically significant difference ($p < 0.01$) after his educational program. This similarities confirmed the vital role of health education program in improving the students knowledge about food safety .

It was amazing to find that the results of present study revealed that there was a highly statistical significant improvement in all items of reported the students' s satisfactory knowledge about methods to prevent contamination of food as hand hygiene before eating , It increased at the immediate post educational program, than that of follow-up and pre program ($P<0.001$) .

Otherwise This finding weren't agree with **Huang (2014**) [19], who Study the effect of food safety education among elementary school students in west China and reported that student knowledge has no significant different between control group and intervention group ($P>0.05$) . This significant improvement from researcher point of view delineated the significant role of nurse in educational program.

Additionally, the present study showed that there was statistically significant improvement in student's satisfactory knowledge about safety food measures. It increased at the immediate post educational program, than that of follow-up and pre program $P<0.001$ .This finding agreed with **Losasso (2014)**[20]who apply education program on knowledge regarding food safety among Italian primary School students found statistically significant improvement in student knowledge ($p<0.001$)post- versus pre-program.

Regarding the effect of educational program mean of student satisfactory knowledge regard food safety the study showed that there were high statistical significant differences. It increased at the immediate post educational program,than that of follow-up and pre program, $P <0.002$.This finding of the current study matched

with a study **Zhou**[13], which study food safety among primary students in China and reported that there was a significant improvement in food safety knowledge scores of the intervention group with ($p < 0.01$) that of the control group in both pre intervention and nine month follow up.

This may confirmed the fact of absolute success of educational program among school age children. As well as this improvement in student knowledge may be due to the characteristic of students in this age group. Additionally, confirmed their ability to accept new knowledge and interested to increase their information and interesting to avoid food borne diseases .

On the other hand few educational programs have been implemented among a primary school student, even though introducing primary school student with new hygiene habits and offering them simplified knowledge based on experience might be effective, education programs and evaluation methods must be adapted to the peculiarity of student learning abilities .[2]

Concerning students' practices regarding safety food measures as hand washing andavoid buying the food from street vender the study showed that there was a high statistical significant differences .It increased at the immediate post educational program, than that of follow-up and pre program ($P<0.001$) .

This finding agree with a study carried out in Korea by **Kim (2013)**[15] about the impact of educational program about safety food on hand hygiene among Korea elementary school children and reported that proper hand washing practice were significantly increased from 6.21 to 9.37 ($P < 0.001$) after educational program.And weren't agree with Huang (2014) who Study the effect of food safety education among elementary school students in China and reported that student practice has no significant different between control group and intervention group($P>0.05$)

Concerning students' habits regarding safety food measures as content of school bag the study showed that there was a high statistical significant differences ($P<0.001$). andit increased at the immediate post educational program, than that of follow-up and pre program

As well as with **Peng**[20], Who apply food safety program among 478 primary school Chinas students and reported that there was an improvement in their habit and tended to be more regular. However, this researcher noticed the gap between knowledge and habits on this issue.

This from the researcher point of view school age children are willing to correction especially in this young age as their attitude could greatly affected if they acquired adequate knowledge, so there is an essential need for adequate educational program to focus on knowledge to raise their awareness and accordingly change their practice and habits .

Regarding the Correlation between students' total knowledge, practice and habits .Current study showed that students total knowledge was significantly correlated with safety food measures at pre, post and follow up program ($p>0.05$). On contrast, student total practices were not correlated with safety food measures at pre, post and follow up program ($p>0.05$). Likewise, student's habits were not correlated with safety food measures at pre and follow up program ($p>0.05$).

The same as **Zhou**[13], who conduct food safety education program among primary school students in China , reported that no statistically significant differences between knowledge, practice regarding safety food. As the student knowledge scores of the post intervention were higher ($p < 0.01$) while student practice in the post intervention was similar to the results of earlier reports.

From researcher point of view this is consistent with the general belief that knowledge is essential but sufficient for safe food practices .Finally, A better understanding of the student about the importance of hand hygiene and repeated practice for food safety measures is the key to improve hand hygiene habits .

Lastly, the researcher can conclude from the findings of the present study that study hypothesis has confirmed that health educational program improved school age students' knowledge and practice about food safety.

As well this study confirmed that the school health nurse is the first responsible person for teaching student about disease, hygiene and risk reduction. The school health nurse must be sensitive to the dynamic nature of this stage, to prevent disease and promote health through health education about nutrition, food safety, hygienic measures, and healthful environment **(Schaffer et al.,).**[21]

As well, effective food safety education implemented in schools should be an important way to reach students and to improve their knowledge and habits in the context of food handling as ensure a safety condition of the packed lunch box and student personal hygiene **(Ovca et al.,).**[3]

V. Conclusion

In the light of the study finding, it might be concluded that there was improvement in students' knowledge , practice and habits regarding safety food at the post and follow-up test than of pretest, with statistical significant differences.

VI. Recommendations

In this regard, the school teachers, parents and other family members could play a vital role. Even, children can also be the agents of change subsequently by spreading what they have learned in school to their family and community member

So, school health policies could eradicate this problem and improve healthy safe food practices by implementing food and safety practices as well nutrition education in their curriculum, which will make them well informed.

Table (1): **Percentage distribution of school students' socio- demographic characteristics(N=152)**

Items	**No**	**%**
NageebMahfoth primary school	54	35.5
Osama Ben Zaid primary school	52	34.2
Asmaa Bent Abby baker	46	30.3
Age in Years		
11-	83	54.6
12	69	45.4
Mean ± SD 11.43± 0.50		
Sex		
Male	75	49.3
Female	77	50.7
Place of Residence		
Rural	4	2.6
Urban	148	97.4
Father Education level		
Illiterate	8	5.3
Read &write	69	45.4
Primary education	51	33.6
Secondary education	18	11.8
High education	6	3.9
Father Occupation		
Governmental employee	69	45.4
Former/ workers	67	44.1
Manual working	12	7.9
On retirement	2	1.3
Died	2	1.3
Mother Education level		
Illiterate	12	7.9
Read &write	69	45.4
Primary education	50	32.9
Secondary education	18	11.9
High education	3	1.9
Mother Occupation		
Governmental employee	8	5.2
Former/ workers	5	3.3
Manual working	49	32.3
Housewife	88	57.9
Died	2	1.3
Crowding index		
< 1	30	19.7
1-2	95	62.6
> 2	27	17.7
Family monthly Income		
Enough	116	76.4
Not Enough	36	23.6

Table (2): Percentage distribution of school students' past and present medical history (N = 152).

	Yes	
Items	**No**	**%**
Colic and fatigue	49	32.2
Diarrhea	40	26.3
Abdominal cramp / Vomiting	67	44.1
Fever / headache	35	23.0
Blood and pus in stool	18	11.8
Previous hospital admissions	12	7.9
Previous hospital admissions of any family members	22	14.5

Figure (1): Distribution of mean of students' satisfactory knowledge regarding about meaning of food & safety foodpre, post and follow up program(No= 152).

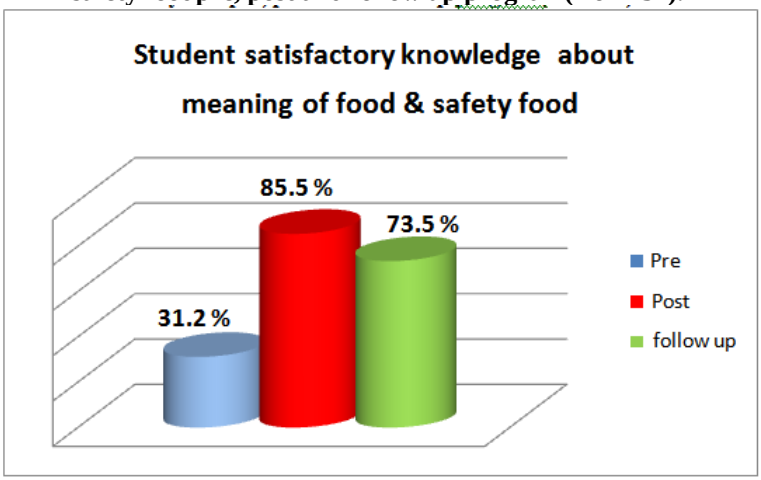
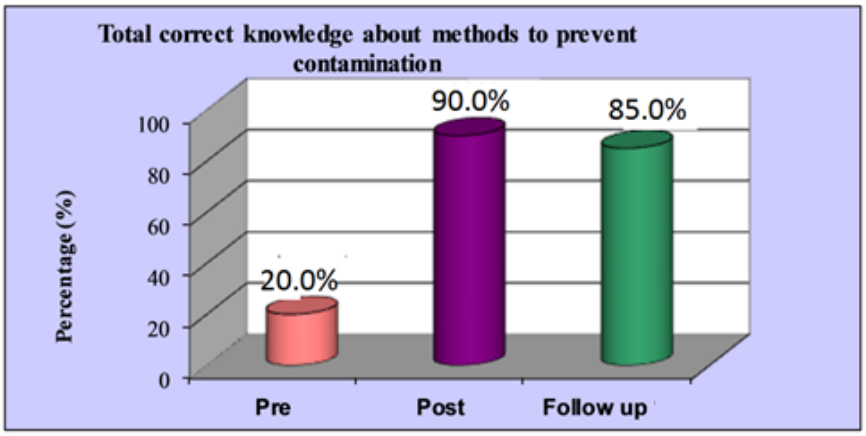


Figure (2Frequency distribution of the students' satisfactory knowledge pre, post and follow-up program regarding methods to prevent contamination of food (N=152).



Students' satisfactory knowledge regarding methods to prevent contamination of food

Figure (3): Frequency distribution of the students' satisfactory knowledge pre, post and follow-up program regarding safety food measure (N=152).

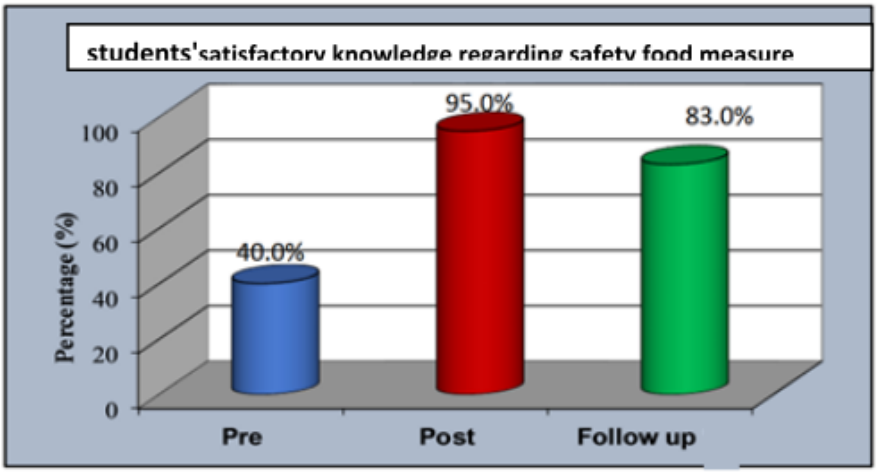


Figure (4): Frequency distribution of school students' reported practices regarding safety food measures pre, post and follow up program (N=152).

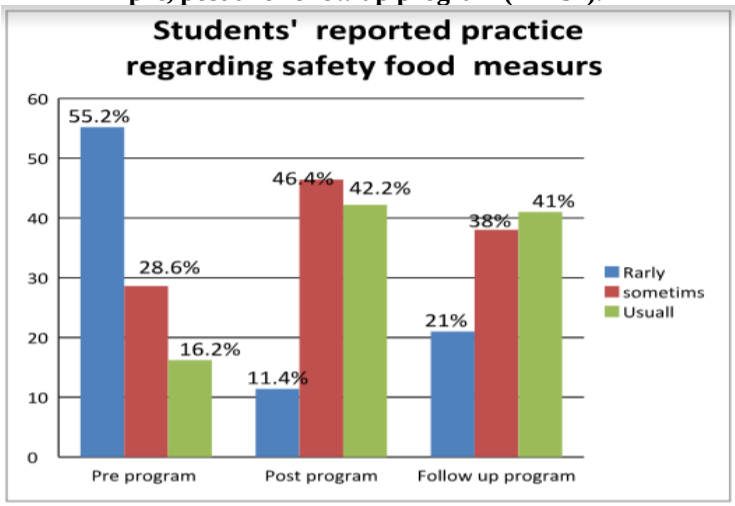


Figure (5) Frequency Distribution of Student' hand washing practice pre, post and follow up program (N=152)

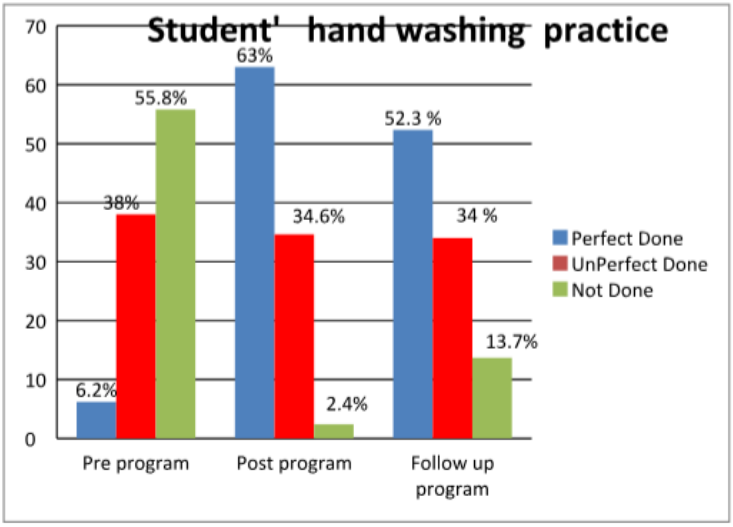


Figure (6): Frequency Distribution of school student' healthy habits as reported regarding content of school bag pre, post and follow up program (N= 152)

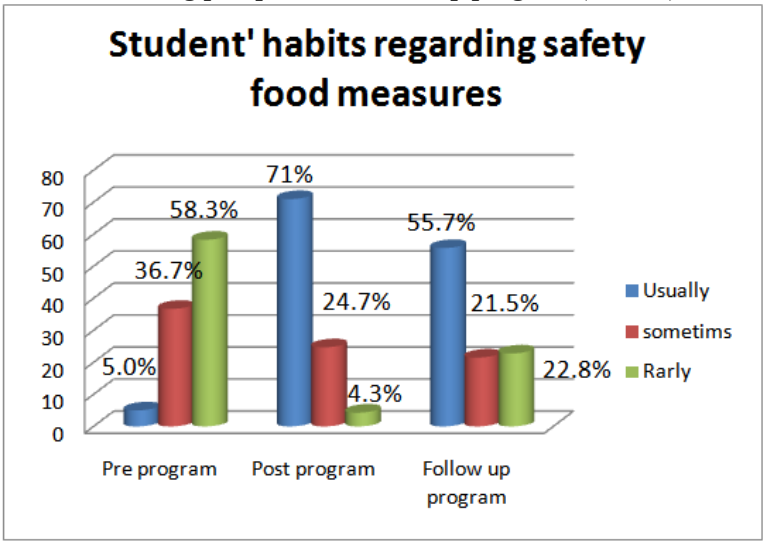


Table (3): Correlation between total knowledge, total practice and habits of students regarding safety food measures pre, post and follow up program (N= 152).

Item	Pre-program		Post program		Follow-up	
	R	P value	R	P value	R	P value
Knowledge	0.624	0.03*	0.991	0.000**	0.949	0.000**
Practice	0.498	0.143	0.130	0.226	0.421	0.720
Habits	0.379	0.019	0.934	0.967	0.026	0.020*

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