
REVIEW ARTICLE

Food Safety among Adolescent Population – A Review

Indumathi S¹, Mahak Sharma^{2*}

¹Faculty of Allied Health Sciences, Department of Nutrition and Dietetics, Manav Rachna International Institute of Research and Studies, Faridabad-121004, Haryana, India

^{2*}Associate Professor, Faculty of Allied Health Sciences, Department of Nutrition and Dietetics, Manav Rachna International Institute of Research and Studies, Faridabad-121004, Haryana, India

Corresponding Author - mahak.fas@mriu.edu.in

ABSTRACT

Adolescents' knowledge regarding safe and hygienic handling of food is vital because foodborne illness and its related death are preventable. This review article is aimed to evaluate the knowledge regarding food safety and practices of hygienic food handling among the current adolescent population. The research papers and articles were referred from different scientific platforms like PubMed, science direct, food science journals. The results revealed a significant low and diminished level of food safety knowledge among adolescents population. Since a lot of research studies statistically proved that effective food safety educational intervention significantly improve knowledge regarding food safety and practices related to food hygiene among the adolescent population. Therefore it's specifically suggested that the execution of food safety syllabus in the school curriculum to develop the knowledge of food safety and food hygiene throughout the learning period of adolescents is the best possible way to solve this problem. Furthermore, it's highly recommended that development of motivation, creation of awareness, and constant positive reinforcement towards food safety's knowledge and food hygienic practices throughout adolescent age provides a window of opportunities to form responsible future adults, results in effective health promotion and prevention of foodborne diseases.

Keywords: Adolescent Population; Food Safety Practices; Food Hygiene; Foodborne Diseases Prevention; Health Promotion; Awareness Education.

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INTRODUCTION

Adolescent age is one of the fast, fascinate and formative phases of human life. World Health Organization defined adolescents as individuals between 10 and 19 years of age. The obvious physical, cognitive, social, emotional, and sexual development during adolescence require special attention to their health care system. Well supported adolescents become responsible, resourceful, and contributing members of families and communities [1]. Adolescent age is a vital stage where nearly half of the human growth occurs. With the onset of puberty and profound adolescent growth leads to equally transformative physical, psychological, and social changes which increased nutritional demands [2]. The largest adolescent population of the world is living in India. Around one-fourth of the adolescent population of India is living in Uttar Pradesh (24.5%) also 19% in Maharashtra, 16.3% in Kerala state [3]. Most of the adolescents in America consume a diet containing high saturated fat, high in sugar, low in vitamins, minerals, and fibre. Four categories of barriers to healthy eating such as individual, environmental, behavioural, and nutritional policies are the adolescent's health affecting factors recently [4].

A study conducted among adolescents in South Korea revealed that a high intake of the coffin was found among 6% of high school students [5]. Approximately 62% of students from middle school were found for frequent intake of processed food once or more per day without knowledge of food labelling and food additives components such as manufacture date, sell-by date, net content, composition of nutrients, place of origin [6]. One-third of the clients affected with foodborne illness were found as school students. Only

below 50% middle and high school students were washing their hands regularly, before eating food. A significantly larger number of students had low awareness level of hand hygiene practice [7]. Foodborne illness is caused due to contaminated and deterioration of food. Foodborne disorders stay a significant general public health issues in the current 21st century. World Health Organization 2007, termed foodborne illness as food poisoning which is defined as the infectious disease caused by the toxic agents present in nature, getting enter into food through the way of ingestion of food [8].

FOOD SAFETY AND ITS AWARENESS

Food safety is related to people's health, social stability, and development. As stated by the World Health Organization 2007, safe food means a degree of assurance about foodstuffs that it will not be a cause of sickness or suffering. The nutrients rich food is one of the basic and vital needs for the substance of life. Food supply nutrition for growth and development. Ensuring food safety is essential due to the direct role of food in the influence on health. Food hygiene measures are necessary to ensure food safety and to prevent foodborne illness. Knowledge and practice of food safety and food hygiene reduces the transmission of the foodborne illness food is exposed to the microorganisms where contamination and deterioration occur in the environment because of the unhygienic practice of food handling. An estimated 1.5 million cases of diarrheal disease are reported every year which is one of the major public health problems in developing countries. Significant impacts of diarrheal disease resulted in malnutrition, further contributed to the impairment of growth and development [9].

A Korean National Health and Nutrition Examination Survey (2013) was revealed about one-third of adolescents have skipped breakfast, and only approximately 25% of adolescents have read the nutrition facts label [10]. Another Web-based Korean Youth Risk behaviour survey (2014) was found that the prevalence of obesity is higher among male adolescents and the level of body image distortion is higher among female adolescents. Almost 45% of female adolescents were attempted unhealthy weight loss methods including fasting, forcible voluntary vomiting and abuse of laxatives and diuretics [11]. Besides, the statistics of foodborne illness (2016) was indicated that nearly 33% of hospitalized clients with foodborne diseases were school-going adolescents [12]. Eventually, the biggest blockade to nutrition education was revealed by a research study that insufficient facilities of teaching aids and learning programs [13,14].

Consumer Food Safety Survey and the Behavioural Risk Factor Surveillance System stated that unhygienic food handling leads to more acute health problems to young adolescent consumer groups rather than others [15]. According to the Ministry of Health, food- and water-borne illnesses lead to permanent health disability and can cause death without immediate treatment [9]. Important two reasons of the current generation have had limited exposure and opportunities to learn food safety and food handling practices are: the first reason noted that teaching syllabus of food safety in home economics, other basic subjects and classes in secondary school level has changed and eliminated in the past decade and the second reason indicated that developing modern culture in working mothers convenience, restaurant foods have diminished the children and adolescent's learning opportunities to observe the cooking method without nutrient loss, food processing method, food storage method, food safety methods in-home practice. The result of these changes may lead to present a huge number of adolescent populations with inadequate food safety behavioural updates to protect their health by themselves and also their communities [15].

Adolescents' ignored safe and hygienic food handling practices, regardless of their needs for learning food hygiene related purchase and preparation of food. In the modern generation, most of the adolescents are chosen their carrier in the food industry form cashier to cook. The necessity of significant understanding required regarding the vital role of knowledge and practices of safe food handling to the adolescent stage [16].

A critical need to develop an education program regarding food safety mainly focusing on hand hygiene and general food safety among adolescents is necessary at present. A study revealed that effective food safety education can influence knowledge, attitude, and behaviour regarding safe food handling among the adolescent population

FOOD HYGIENE - KNOWLEDGE, ATTITUDE AND PRACTICE

Food hygiene is defined as, "the measures and conditions necessary to control hazards and to ensure fitness for human consumption of a foodstuff taking into account its intended use" [17]. Food illnesses are defined as, "diseases, usually either infectious or toxic, caused by agents that enter the body through the ingestion of food" [18].

Worldwide statistics on foodborne diseases stated that food-borne diseases are rising at peak level every year and food poisoning cases are highly recorded among school students [19]. Food-borne illness can be

prevented through educating safe food handling practices among adolescent students at the right stage of life [20]. Food preparation at home level found out as a poor food hygiene practices with 95.4% failing to handle basic food hygiene practices due to the lack of knowledge to carry out known food hygiene procedures [21,22,23]. This statement is acknowledged that schools are the significant places where can develop health promotion which include hygiene based behaviours [24,25,26]. The bad habits are developed in the adolescence stage at once, that will be difficult to alter and long-lasting in adulthood also [27].

The study conducted in Taif University, Saudi Arabia, registered the overall knowledge, attitude and practice mean score was 74.78% [28] and another study in Ethiopia revealed that approximately 52% of food hygiene knowledge among school adolescents [29]. There are numerous studies which highlight the assessment and impact of knowledge, attitude, and practice of food hygiene among adolescents. A study conducted by Almansour, (2016) evaluated the knowledge, attitude, and practice of food hygiene among school students. The study revealed a staggering fact that the knowledge regarding food hygiene in intermediate level students ($55.08 \pm 11.53\%$) was lower than primary level students ($55.44 \pm 13.53\%$). Likewise, the attitude of food hygiene at the intermediate level ($55.62 \pm 10.34\%$) was lower than primary level students ($60.84 \pm 11.49\%$). The findings suggested that most of the intermediate level students were adolescents and the possible causes like lack of concentration and lack of interest in adolescents affected their food hygiene. The study recommended the inclusion of food safety education in the school curriculum, awareness campaigns regarding food hygiene for teachers, students, and the general public and widespread knowledge about food hygiene through social media. Another online cross-sectional inquiry was done to estimate knowledge regarding food hygiene among 1178 adolescent students. The study highlighted that university current curriculum lack in improving adolescent student knowledge about food safety and greater need for food safety educational intervention and its implementation at university curriculum to improve knowledge and awareness on food hygiene among adolescent students [30,31].

A study conducted by Barclay, (2003) investigated knowledge, practices, and educational needs of safe food handling practices among students of Grade 3 to 10. A total of 1368 students participated in this study. The study revealed that 90% of subjects surveyed with a lack of understanding of food safety. Especially male students were appeared to follow unsafe food handling practices than females. The study recommended that food safety knowledge should be administered effectively to the students throughout systematic school education. Another research has given similar kind of results in which the study assessed knowledge, attitudes, and self-reported practices regarding food safety among 2860 students in high school by using a school-wide survey. Findings suggested that knowledge of food safety among subjects was low as evidenced by only 17.3% of respondents knew that the best method to measure the temperature with a food thermometer of cooked hamburgers before eating it, and 45.1% participated students attended neither food and nutrition course nor food handler certification course. Study findings concluded that the students were confident about safe cooking and healthy eating practices yet their lack of interest in safe food handling and lack of knowledge about foodborne diseases were need more workouts. The study suggested that adolescent students should be reinforced to learn about food safety and more opportunity for safe food handling practices [32,33].

Another study done by Bryant and Barrett, (2000) highlights the assessment of knowledge and practices on safe food-handling among 80 youths. Results revealed that approximately 86% of the participants informed as preparing meals and among those preparing meals only 70% reported to know about food safety. Yet, significant inadequate knowledge regarding foodborne illness was reported. A disgusting fact revealed that only 45% of subjects were hand washing regularly before starting food preparation [34].

FOOD SAFETY - KNOWLEDGE, ATTITUDE AND PRACTICE

A cross-sectional study was done in China, to assess knowledge, attitude, and self-reported practices regarding food safety among 4220 students. Adolescents considered as a special group with high risk for foodborne diseases were targeted for food safety interventions in this study. Knowledge of food safety (median = 11, IQR: 9-13) and demographic characteristics such as region, school, residence, alcohol abuse, cigarette smoking, academic achievement, and parent's knowledge were statistically significant. The data stated that only 17% were feeling happy about the food safety attitude and practice of their country and 53.6% were worrying about their national food safety attitude and practice. Further 95.3% worried about the consumption of unsafe food from small restaurants and street peddlers even though 69.4% of students continued the consumption of food from peddlers around their school surroundings. The findings reinforced that effective, well planned, and goal-oriented food safety educational intervention definite necessity among adolescents [35].

A nationwide online survey conducted by Wheatley, (2007) to evaluate self-reported behaviours and cognitions related to food safety among young people. The participants were mostly unmarried females. The analysis of data reported that poor food safety knowledge among surveyed subjects was contributed to the consumption of risky foods. Further young adults reported for significant declined levels of self-rated knowledge and skill regarding food safety. Significantly limited intake of food consumption of young people specifically females were found susceptible to foodborne disorders [36].

A formative research study was conducted to identify food literacy educational opportunities among six focus youth groups in elementary schools. Inductive and deductive content analysis approach was used to evaluate the literacy experiences, perceived knowledge, skills, and behaviours regarding food. Results of this study identified five cardinal food literacy themes among focus groups includes food system concepts, food freshness and safety, gardening environmental knowledge and skills, cooking environmental perceived skills and safety, and autonomy of meal preparation. The findings highlighted that the emerged themes in focus groups gathered new ideas around children's perceived food literacy knowledge and skills and also introduced valuable settings related to the food environment (school vs. home). Further fascinated that new ideas like the "farm to plate" condition were reported and future focus on possibilities of school-based chances where a successful expansion of food literacy themes. The study highly recommended that the availability of more educational opportunities based on the food literacy curriculum helpful in the development of effective food-based educational interventions [37]. Another recent review on food literacy among school-going adolescents from databases of sixteen countries was identified that a significant positive influence on healthy diet intake and basic knowledge of nutrition [38].

A study was conducted to find out the current condition of home food safety, the main reasons for food safety failure, and a comparison to the Food and Drug Administration's recent baseline in various foodservice establishments. Study results estimated regarding errors of food safety such as approximately 40% related to inadequate information, almost 40% resulted in ignorance, and around 20% related to loss of interest. The study criticized that home food is not any safer than restaurants [39]. World Health Organization reported that a majority of foodborne diseases are caused by improper preparation and handling of the food at home, in restaurants and markets [40]. Many people cook with an excessive amount of edible oil and such a frequently cooking practices produced a lot of waste oil, which might be used in home and also illegally supplied to the restaurants for reuse which may affect our health seriously [41,42].

A survey on food safety and eating habits in Beijing revealed that around 75% of adolescent students eat food from unlicensed peddlers at least once in a week, which may be threatened to potential risk for foodborne illness [43]. Also, a study found that while having a huge variety of food choice, adolescent population have a lack of knowledge about the selection of food materials which might be lead to serious health problems [44,45].

A Japanese study assessed the knowledge, attitude and practices of food safety among University students informed that most of the food safety studies focused exclusively on adults, which may suggest that a lack of research on adolescents food safety [46]. Guinan, (1997) investigated the food safety practice of handwashing habits in controlling and preventing infections among 120 middle school and high school students. The findings surprised that approximately 48% of male students and almost 58% of female students had washed their hands regularly after bathroom use. Further female students reported more frequent and longer hand washing with the use of soap than male students. The co-relational research evaluated knowledge related to food safety with home preparation practices of food among consumers. Research findings of a nationwide survey reported that demographic and lifestyle changes significantly influenced food choices and home food preparation practices. Further indicated that a substantial percentage of foodborne disease outbreaks were found related to food prepared in the home. The Study results suggested that a lack of understanding about the basic principles of safe food preparation was found among children and adolescents who may grow into adulthood without food safety knowledge. The study recommended the development of an effective food safety education program for consumers [47].

Several studies showed that knowledge, attitude and practice of food safety among the general population was in pathetic condition [48,49,50]. In fact knowledge, attitude and practices of food safety among adolescents was limited because past studies lacked well-designed investigation into this age group [51,52,53]. A school-based assessment on knowledge, attitude and practices of nutrition and food safety among students revealed that healthy eating practices develop from a positive mental attitude and a sound knowledge of nutrition and food safety [54].

CONCLUSION

Nationwide surveys conducted on adolescents in India, which alarmed for focused attention to specific health and social needs of this vulnerable group. Further, a lot of negative impacts were found in the various researches around the world regarding adolescents' food safety and food hygiene knowledge level. It has therefore been realized that lack of food safety knowledge and unhygienic food handling which leads to more acute health problems like foodborne diseases, which can cause impaired growth and cognitive development of adolescents. Furthermore, the ignorance of the foodborne diseases without proper treatment evidenced the dangers of permanent health disabilities and also may pose to death. The two main causes of the problem were identified that the current educational curriculum lack in improving adolescents' food safety knowledge and developing modern culture such as working mothers and restaurant foods which diminished the adolescents' learning opportunities of home food preparation and also forced adolescents to purchase and prepare food without supervision. Additionally, a substantial percentage of foodborne disease outbreaks were reported due to food prepared in the home. Hence home foods are not any safer than restaurants. Adolescent represents the next generation of food handlers, who are frequently consuming processed food with the lack of food labelling knowledge, is one of the high-risk factors of food poisoning. Adolescence is a crucial stage to provide safe food handling knowledge before develop bad food habits which can cause severe foodborne diseases. The review of several studies stated that food safety education at the school level helped to improve adolescents' safe food handling knowledge and practices significantly. Education Council should take immediate action to develop nationwide food safety and a food hygiene education program among adolescents is the need of the hour. Henceforth, immediate measures like the inclusion of food safety education in the school curriculum, awareness campaigns regarding food hygiene for teachers, students, and the general public and widespread knowledge about food hygiene through digital social media are highly recommended. This review is intended to create awareness about the importance of food safety through the educational system among the adolescent population.

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