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PREVALENCE OF INSTANT NOODLES CONSUMPTION AMONG SCHOOLGIRLS: A CROSS- SECTIONAL STUDY IN PUBLIC SCHOOLS IN THE GAZA STRIP, PALESTINE

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ABSTRACT

The overconsumption of instant noodles has recently received special attention due to its association with obesity and cardiometabolic syndrome. Accordingly, the current study aims at identifying the extent of instant noodle consumption and its association with place of residence among schoolgirls in public schools in the Gaza Strip, Palestine. A total of 2694 schoolgirls aged 12-18 years were selected randomly to fill a questionnaire especially designed for this purpose. The results of the current study revealed that 73.1% of the participants were found to consume instant noodle, whereas 26.9% were not. The study revealed that 60.5% of the interviewed participants eat instant noodle once a day, 31.3% eat twice a day and 8.20% eat more than twice a day. About 71.6% of the schoolgirls were found to consume both cup and packet instant noodles. Also the study showed that the majority of the interviewed participants (94.5%) proved that they add spices packet to instant noodle. The proportion of the participants who added oil packet to instant noodles was significantly higher compared with those who did not. Furthermore, there were significantly fewer participants who added vegetables to instant noodles compared to those who did not. About 53.0% were found to consider the instant noodle as a basic meal, whereas the remainder consider it as a complementary meal. All variables related to instant noodle consumption were significantly associated with place of residence.

KEYWORDS: Instant noodle, questionnaire, schoolgirls, consumption, governorate, Gaza Strip, Palestine.

INTRODUCTION

Food is considered one of the most important needs of people during adolescence period. Adolescence is the transition state from childhood to adulthood and is characterized by rapid physical and psychosocial growth and development (Leroy et al., 2018). Inadequate nutrition in adolescence remains one of the key factors for life of adolescents and may have long term consequences for their health (Leroy et al., 2018; Winpenny et al., 2018). Also, particularly for girls, it can affect the survival, health, and well-being of their children (Christian, 2018). During the recent years, technological progression in the food industry has led to the production of ready food (Charles et al., 2018), therefore, the consumption of ready meals including instant noodle (indomie) is highly increasing worldwide among adolescents within schools, institutions and universities (Chin et al., 2012; Tajdar-oranj et al., 2018). In the study of Nelson et al. (2009), they reported that the quantity of instant noodles consumption of college students were more extremely than adults in other age groups.

Instant noodles are an internationally important food eaten widely around the world (Wu et al., 2018). Their popularity is increasing due to several reasons such as the desirable flavor, color, taste and texture, affordable price, longer shelf-life and rapid preparation time (Gulia et al., 2014; Wu et al., 2018). Instant noodles tend to be less healthy when compared to foods prepared at home because they are nutrients-poor and contain high concentration of carbohydrates and fats (Nguyen and Powell, 2014).

Overconsumption of instant noodle has paid special attention due to its association with health risks such as high dietary glycaemic index (Zuniga et al., 2014), higher body mass index (BMI), obesity or overweight, cardiometabolic syndrome, hypertension, increased blood levels of lipid and glucose, as well as metabolic diseases (Duffey et al., 2009; Smith et el., 2012; Shin et al., 2014; Kant et al., 2015; Huh et al., 2017; Janssen et al., 2018). The potential risks of heavy-metal intake in instant noodle to human health may be carcinogenic or non-carcinogenic (Yi et al., 2011; Sultana et al., 2017). In the study of Charles et al. (2018), they revealed that the frequent consumption of instant noodle may be lead to heavy metal which result in impaired of systems of the human body. Some of the heavy metals are within the permissible limit, but continuous consumption could help accumulation of these contaminants within the human body.

Many studies have been achieved on instant noodle intake on the health of consumers. For example Shin et al. (2014) carried out an experimental study to investigate the association

between dietary patterns, instant noodle consumption, and cardiometabolic risk factors. They found out that the consumption of instant noodles 2 times/week was related with a higher prevalence of metabolic syndrome in women but not in men. Recently, Charles et al. (2018), investigated levels of some heavy metals and polycyclic aromatic hydrocarbons (PAHs) in instant noodles commonly consumed in Nigeria. They showed that frequently consumption of instant noodles may lead to heavy metal toxicity which result in impaired neuronal and renal functions.

In the study of Shin et al. (2014), they investigated the association between dietary patterns, instant noodle consumption, and cardiometabolic risk factors. They showed that the TP (traditional dietary pattern) was associated with a lower prevalence of abdominal obesity, whereas the MP (meat and fast-food pattern) was associated with abdominal obesity, high LDL cholesterol, and decreased prevalence of low HDL cholesterol and hypertriglyceridemia. Instant noodle consumption was associated with increased prevalence of metabolic syndrome in women.

Due to the exceptional circumstances of the Gaza Strip, which is characterized by high poverty and unemployment rate, many people, in particular students within schools, resort to consume instant noodle as a source of food because of their low price. In the Gaza Strip, the prevalent of instant noodle consumption has not been previously investigated. Therefore, the aim of this study was to investigate and record the extent of instant noodle consumption among schoolgirls in public schools of the Gaza Strip, Palestine. The targeted category of the students who age were from 12 to 17 was precisely chosen because this category was the highest in consumed of instant noodle when compared to other categories (i.e. children and adulthoods) and therefore was the most suitable for studying the community. In addition, these age groups are consider a critical period in the life of schoolgirls that play an important role in their education. The reason standing behind choice females without males is that the heavy consumption of instant noodle has a greater effect on females than males (Shin et al., 2014).

MATERIALS AND METHODS

The study was cross-sectional and it was conducted among schoolgirls aged 12–18 years drawn from public schools located in the governorates of Gaza Strip, Palestine.

The Gaza Strip is a penne region of Palestine located on the eastern coast of the Mediterranean Sea with an area of 365 km² (Radwan, 2017; Abd Rabou and Radwan, 2017 and 2018). The Gaza Strip is a densely populated (about 2.0 million) and impoverished region inhabited mainly by the Palestinian refugees; the majority live in overcrowded refugee camps. The Governorates of the Gaza Strip are 5 administrative districts. These governorates are: North Gaza, Gaza, Middle Gaza (Deir Al-Balah), Khan Younis and Rafah (Figure 1). In the current study the participants were divided according to the number of directorates of education. In Gaza Strip, the administrative structure of the general education is composed of 6 fields' directorates (districts offices) of education. The six directorates of education are: North Gaza, West Gaza, East Gaza, Middle Gaza, Khan Younis and Rafah.

This study was approved by the Human Institutional Ethics Committee at the Islamic university of Gaza. The duration of the study was 4 months, from March 1 to July 31, 2018. The study used a semi structured questionnaire to collect information related to the current study. The interviews were conducted at the participants' schools by trained researchers. They were explained about the purpose of the study and necessary informed consent was obtained. With respect to the contents of the questionnaire, the Alpha Cronbach coefficient was found 0.714. This value revealed good internal consistency and reliability of the items of questionnaire. The questionnaire was first piloted in twenty participants and required modifications were made based on feedback. Then the final version of the questionnaire was distributed.

Overall, a total of 2694 schoolgirls were included in this study. All schoolgirls responded to the questionnaire. The participants were given appropriate instructions about filling the questionnaire. The participants were given 15 minutes to complete the questionnaire. The following information was collected from the interviewed participants: demographic characteristics, frequency of instant noodle consumption on a day and week, type of consumed instant noodle (Figure 2 A & B), number of packet or cup per meal, consumption of cooked or uncooked instant noodle (Figure 2 C & D). Figure 1 illustrate the most consumed type of instant noodle among schoolgirls in the study area. In addition, the participants were asked to indicate whether they add spices, oil and vegetables to instant noodle or not (Figure 2 E & F).

The analyses were conducted using Statistical Package for the Social Sciences (SPSS) version 20.0. Descriptive statistics were used in analyzing and characterizing the sample.

Data was presented in percentages. A chi-square analysis was used to determine differences among the instant noodle intake groups according to frequency of instant noodle consumption and other related questions. A chi-square analysis was also applied to assess the association between place (governorate) of residence of the interviewed participants towards question related instant noodle consumption. The significance level adopted in these tests was 5% ($p<0.05$).

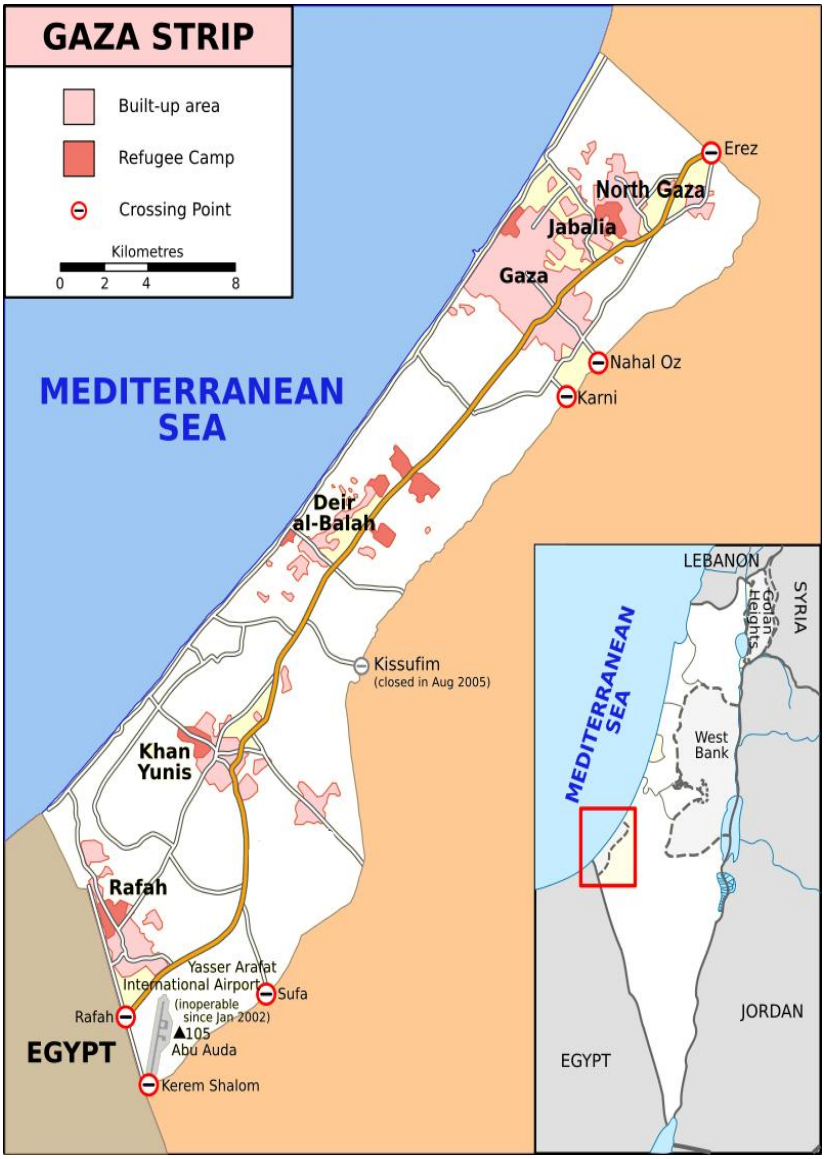

Figure 1: The five governorates of the Gaza Strip.

Figure 2: Descriptive of consumed instant noodle: (A) Cup instant noodle, (B) Packet instant noodle, (C) Uncooked instant noodle, (D) Cooked instant noodle, (E) and (F) Oil and spices packets inside instant noodle.

RESULTS

Demographic characteristics of study participants

All the interviewed participants who received the questionnaire completed it properly. A total of 2694 participants were included in this analysis. Of all participants, 73.1% (N=1970) were found to consume instant noodle and 26.9% were not. The mean age of participants was 13.75±1.84 years. Detailed demographic characteristics of the study population are presented in Table 2. With regard to place of residence, participants (43.7%) who live in Gaza governorate were more frequently consume instant noodle when compared to other governorates.

Table 2: Demographic characteristics of participants who consume instant noodle (N=1970).

Parameter	Sub-Group		N	Percentage
Age	12-13		1028	52.2%
	14-15		390	19.8%
	16-17		552	28.0%
Governorate	North Gaza		490	24.9%
	Gaza Governorate	West Gaza	594	30.2%
		East Gaza	265	13.5%
	Middle Gaza		266	13.5%
	Khan Younis		165	8.4%
	Rafah		190	9.6%

The status of instant noodle consumption among study participants

Data concerning instant noodle consumption are presented in Table 2. The age frequency showed that 52.2% of the interviewed participants were from 12-13 years, 28.0% from 16 to 17 years and 19.8% from 14 to 15 years.

According to data for the status of instant noodle consumption, the highest percentage of the total sample (60.5%) proved to consume instant noodle once a day, 31.1% consume twice a day and the rest percentage (8.20%) consume more than twice a day. Analysis of the results showed that the difference between three categorizes was highly significant. On a weekly basis, 45.6% reported consumption of instant noodle once a week, 23.4% were twice a week and 19.7% were more than twice a week. The proportion of the interviewed consumers who eat instant noodle every day on a week were significantly lower than those who eat once, twice or more on a week.

In addition, the findings revealed that there were statistically significant differences in replay to question on consumption of cooked or uncooked instant noodle. Approximately 74.7% of the interviewed participants indicated that they consume both cooked and uncooked instant noodle, 17.7% eat cook instant noodle, and the rest eat the naked instant noodle without cooking.

Table 2: Response of the participants regarding to instant noodle consumption.

Variables								*P*-value*
Age of the interviewed participants								
	12-13		14-15		16-17			0.000
Frequency	1028		390		552			
Percentage %	52.2%		19.8%		28.0%			
Frequency of instant noodle consumption on a day								
	1 time/day		2 times/day		>2 times/day			0.000
Frequency	N=1193		N=616		N=161			
Percentage %	60.5%		31.3%		8.20%			
Frequency of instant noodle consumption on a week								
	Every day		1 time/week		2 times/week	>2 times/week		0.000
Frequency	N=223		N=898		N=461	N=388		
Percentage %	11.3%		45.6%		23.4%	19.7%		
Adding spices and oil to instant noodle on a week								
	Every day		1 time/week		2 times/week	>2 times/week		0.001
	Yes	No	Yes	No	Yes	No	Yes	No
Frequency	201	20	871	27	455	6	370	20
Percentage %	10.2%	1.0%	44.2%	1.4%	23.1%	0.30%	18.8%	1.0%
Type of consumed instant noodle								
	Cup instant noodle		Packet instant noodle		Both of them			0.000
Frequency	N=352		N=208		N=1410			
Percentage %	17.9%		10.6%		71.6%			
Number of packets or cups per meal								
	1 packet or cup/meal		2 packet or cup/meal		>2 packet or cup/meal			0.000
Frequency	N=1702		N=165		N=103			
Percentage %	86.4%		8.40%		5.20%			
Consumption of cooked or uncooked instant noodle								
	Cooked indomie		Uncooked indomie		Both of them			0.000
Frequency	N=349		N=150		N=1471			
Percentage %	17.7%		7.60%		74.7%			
Adding of spices to instant noodle								
	Yes		No					0.000
Frequency	N=1862		N=108					
Percentage %	94.5%		5.50%					
Adding oil to instant noodle								
	Yes		No					0.000
Frequency	N=1212		N=758					
Percentage %	61.5%		38.5%					
Adding vegetables to instant noodle								
	Yes		No					0.000
Frequency	N=579		N=1391					
Percentage %	29.4%		70.6%					
Considering instant noodle as a basic meal								
	Yes		No					0.008
Frequency	N=1044		N=926					
Percentage %	53.0%		47.0%					

* Calculated by Chi square test (χ^2), *P* value significant at ≤ 0.05.

When asked whether participants add spices to their meal, the overwhelming majority of them (94.5%) add the spices to instant noodle but the rest were not. In replay to question on adding oil to instant noodle, 61.5% of schoolgirls add oil to instant noodle whereas 38.5% did not. In both cases the differences between categorizes were statistically high significant.

The results of the current study showed that the proportion of the participants who add vegetables to instant noodle was significantly lower than those who did not. Furthermore, there were significantly higher participants who considered the instant noodle as a basic meal compared to those who did not.

The results showed that there were statistically significant differences among categorizes in replay to the question "What type of instant noodle do you usually consume?". The majority of the interviewed participants (71.6%) reported usually consume both cup and packet instant noodle, 17.9% consume only cup instant noodle and the rest participants consume only packet instant noodle. Also, the results of the study revealed that the participants who consume either cup or packet instant noodle add different amount of instant noodle in their meals. The high proportion of the interviewed participants (86.4%) use only one packet or cup for each meal, 8.40% 2 packets or cups for each meal, and finally 5.20% use more than 2 packets or cups for each meal.

As clearly shown in Table 3, significant association was found between each variable and the place of residence (p = 0.000). On a daily basis for one time, the proportion of the schoolgirls in governorate of North Gaza was significantly higher for frequency of instant noodle consumption as compared to those in other governorates. The study also revealed that Khan Younis governorate was the highest among other governorates regarding to consumption of instant noodle twice a day. Governorate of Middle Gaza was found the highest with respect to instant noodle consumption more than twice a day.

Concerning to kind of consumed instant noodle, the schoolgirls in directorate of education of West Gaza was significantly lower than those schoolgirls in other directorates of education for consumption both cup and packet instant noodle. The study also revealed that Khan Younis governorate was the highest (100.0%) among other governorates regarding to consumption both kinds instant noodle. In addition, the number of cups or packets that used

per meal was significantly influenced with the place of residence of the interviewed participants. The North Gaza governorate was found the highest (100.0%) regarding to consume one cup or packet per meal when compared to other governorate.

Table 3: Associations of place of residence with instant noodle consumption.

Variable	Gaza				Middle Gaza		Khan Younis		Rafah		North Gaza		*p*-Value**
	East Gaza		West Gaza										
	N	%*	N	%*	N	%*	N	%*	N	%*	N	%*	
Variable													
Type of consumed instant noodle													
Cup instant noodle	75	12.6	108	40.8	29	10.9	0	0.0	22	11.6	118	24.1	0.000
Packet instant noodle	29	4.9	48	18.1	45	16.9	0	0.0	30	15.8	56	11.4	
Both of them	490	82.5	109	41.1	192	72.2	165	100	138	72.6	316	64.5	
Frequency of instant noodle consumption on a day													
1 time/day	371	62.5	155	58.5	130	48.9	22	13.3	105	55.3	409	83.5	0.000
2 times/day	180	30.3	89	33.6	96	36.1	132	80.0	70	36.8	49	10.0	
>2 times/day	43	7.2	21	7.9	40	15.0	11	6.7	15	7.9	32	6.5	
Number of packets or cups per meal													
1 cup/packet	499	84.0	229	86.4	189	71.1	152	92.1	143	75.3	490	100	0.000
2 cup/packet	46	7.7	32	12.1	50	18.8	10	6.1	27	14.2	0	0	
>2 cup/packet	49	8.2	4	1.5	27	10.2	3	1.8	20	10.5	0	0	
Consumption of cooked or uncooked instant noodle													
Cooked	86	14.5	56	21.1	10	3.8	0	0.0	16	8.4	181	36.9	0.000
Uncooked	18	3.0	14	5.3	45	16.9	0	0.0	4	2.1	69	14.1	
Both of them	490	82.5	195	73.6	211	79.3	165	100	170	89.5	240	49.0	
Adding of spices to instant noodle													
Yes	566	95.3	245	92.5	235	88.3	165	100	180	94.7	471	96.1	0.000
No	28	4.7	20	7.5	31	11.7	0	0	10	5.3	19	3.9	
Adding of oil to instant noodle													
Yes	392	66.0	159	60.0	143	53.8	164	99.4	117	61.6	237	48.4	0.000
No	202	34.0	106	40.0	123	46.2	1	0.6	73	38.4	253	51.6	
Adding vegetables to instant noodle													
Yes	172	29.0	73	27.5	106	39.8	22	13.3	74	38.9	132	26.9	0.000
No	422	71.0	192	72.5	160	60.2	143	86.7	116	61.1	358	73.1	
Considering instant noodle as a basic meal													
Yes	352	59.3	121	45.7	176	66.2	158	95.8	88	46.3	149	30.4	0.000
No	242	40.7	144	54.3	90	33.8	7	4.2	102	53.7	341	69.6	

* Percentage (%) within governorate.

** Calculated by Chi square test (χ^2), *P* value significant at ≤ 0.05.

The current study showed that high proportion of the interviewed participants in all governorates eat both cooked and uncooked instant noodle. The present study showed a significant difference between consumers with regard to intake instant noodles, in the sense

that the most of them consume cooked instant noodle and sometimes consume uncooked instant noodle. Governorate of Khan Younis seem to be the highest (100.0%) and North Gaza the lowest (49.0%) among governorates.

The statistical analysis of the results showed that there were statistically significant differences among schoolgirls in the prevalence of consumption of the spices packets inside instant noodle. The proportion of the schoolgirls in governorate of Khan Younis was significantly higher (100.0%) than those in other governorates. Also Khan Younis governorate was found the highest among other governorates respecting to add oil packet to instant noodle. In addition, Regarding to add vegetables to instant noodle, Middle governorate was significantly the highest when compared to remainder governorates. The participants mentioned such these vegetables: tomato, cucumbers, carrots, peppers, corns and chick-pea. Analysis of the results showed that Khan Younis was the highest among other governorates with regard to considering instant noodle as a main dish in their breakfast, lunch or dinner.

DISCUSSION

To our knowledge, this study represents a unique attempt to document the status of instant noodle consumption in the Gaza Strip, Palestine. The results we obtained in this survey by analyzing data from the questionnaires distributed among schoolgirls show that among these students, instant noodle is a well-known consumed food. As many as 73.1% of the study sample reported to consume instant noodle. Similar results were documented in multi-purpose studies related to instant noodle consumption in different countries worldwide. Nepal was one of these countries where various studies were carried out. For example Heydon et al. (2009) found out that instant noodle is one of the most frequently consumed manufactured foods. The same result was also reported in the study of Fernández-Alvira et al. (2013).

Usually, participants who frequently consumed instant noodles had a lower family income level than infrequent consumers. This finding seem to coincide with the results reported by Huh et al. (2017) in Korean college students. Also, similar results were documented in the study of Fernández-Alvira et al. (2013), they carried out a study to investigate the relationship between parental education level and the consumption frequency of obesity-related foods in European children. They showed that parental education level affected the intake of obesity-related foods in children. The intakes of low-sugar and low-fat foods (vegetables, fruits, wholemeal and bread) increased as education level increased; while intakes of sugar-rich and

fatty foods (fried potatoes and fast food including instant noodle, sugared beverages and desserts) increased as educational level decreased. On the contrary, the present results disagree with that stated by Vijayapushpam et al. (2003). They carried out a study to assess the nutrition knowledge levels and dietary intake pattern of schoolchildren belonging to two groups of different socio-economic status (SES; high income/high SES and low income/low SES). They mentioned that children from the high SES background preferred fast foods such as instant noodles to traditional foods. For fast foods like instant noodles, 28% of children from the high-income group consumed these foods daily, whereas 50% of children from the low income group consumed these foods once or twice a week.

A surprising result was that a few percent (11.3%) of the schoolgirls we studied reported to consume instant noodle daily on a week. Similar results were reported previously by Heydon et al. (2009), they mentioned that instant noodles were consumed every day by children and adultescence.

From this study, it was clear that the high percentage of the students frequently add spices and oil packets to instant noodle. Similarly these findings were in agreement with Heydon et al. (2009). They revealed that the children who frequently consume instant noodles also consume additive and flavor packets including spices and oils.

In the Gaza Strip, consumption of instant noodle was found to increase among schoolgirls. The reason standing behind increased consumption of instant noodle among schoolgirls is due to lower income of their families and their breadwinner is unemployed may be due to low education level. The students usually buy instant noodle and consider it as a basic meal due to its low price as well as inability to buy other kinds of foods. The Palestinians in the Gaza Strip live below poverty line due to blockades imposed by the Israeli army since a couple of years (Abd Rabou and Radwan, 2018). Similar results were documented in the study of Fernández-Alvira et al. (2013). On the contrary, this finding disagree with that stated by Vijayapushpam et al. (2003). They found out that the percent of children from high-income family is higher than the percent of children from low-income family with regard to frequently consumed instant noodle.

For frequency of instant noodle consumption on a day, the results of the present study showed that the proportion of the consumers who live in North Gaza show relatively higher than those who live in other governorates. The students mentioned reason for increased

consumption of instant noodle. They reported that their families had a lower socioeconomic status and many times they can not to get another type of foods including meat, vegetables and fruits. The annual consumption of instant noodle, especially in poverty families, is increasing due to their convenience and low cost (Wu et al., 2013).

The study also reported different kind of consumed instant noodle. The schoolgirls eat packet or cup instant noodle. The proportion of the participants who consumed cup instant noodle were higher than the participants who consume packet instant noodle. The reason standing behind prefer consumption of cup instant noodle was mentioned in the study of Wu et al. (2013). They reported that packet instant noodle remain less convenient and therefore less likely to be used, especially by children because it need more time to prepared as compared to cup instant noodle that ready-made for consumption. In addition, the interviewed participants mentioned that the packet instant noodle need to cook with boiling water and therefore they afraid to use the oven or heat to avoid burning. As a result they frequently prefer and consume ready cup instant noodle than packets. The results also showed that the highest percent (71.6%) of schoolgirls consume both packet and cup instant noodle. They mentioned that they consume cup instant noodle when they are outside their homes (school or picnic) and also consume packet instant noodle with their families when they are at home, in the sense that a member of their families prepare it with additives. They mentioned such additives as follows: meat, spices, palm oil and various kind of vegetables including tomatoes, potatoes, carrots, cucumber, pepper, corns, pea, garlic and onions.

In this representative study, in all governorates, the lowest proportion of the interviewed schoolgirls eat uncooked instant noodle rather than cooked noodle, whereas the highest proportion of them eat both cooked and uncooked instant noodle. As mentioned above, they often eat cooked instant noodle when they are at home because of their parents, sisters or brothers prepare the meal properly (instant noodle) in breakfast, lunch or dinner. Similar results were documented in the study of Heydon et al. (2009), they revealed that children frequently consume naked instant noodle (uncooked), eat it straight from the packet, but adults usually consume boiled noodles (cooked noodle).

CONCLUSION

Our results revealed that 73.1% of the interviewed participants were found to consume instant noodle, whereas 26.9% were not. With respect to consumption frequency on a day, the study revealed that 60.5% eat once a day, 31.3% eat twice a day and 8.20% eat more than twice a

day. About 71.6% of the schoolgirls consume both cup and packet instant noodle. Also the study showed that the majority of the interviewed participants proved that they add spices packet to instant noodle. Recorded percentage of the schoolgirls who add oil packet to instant noodle was significantly higher than those who do not. In addition, the proportion of the interviewed participants who add vegetables to instant noodle were significantly lower than those who do not. Finally, the results of the current survey should be taken into consideration by decision makers with more targeted policies aiming at improving the awareness about dangerous effects of overconsumption of instant noodle among the students who will be the backbone in the future.

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