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Fast Food Consumption and its Relation to Mental Health among Female Secondary School Students in Eastern Saudi Arabia

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Abstract: ***This cross-sectional study examined the relationship between fast food consumption and mental health among female adolescents in Saudi Arabia. Data was collected from 417 female students from three main cities in the Eastern Province. Self-reported questionnaires were used to assess fast food consumption and mental health. A total of 76.5% of respondents ate fast food, and 69.5% did so once or twice per week. The percentage of abnormal internalizing and externalizing scores was 7.4 and 5.5, respectively. Fast food consumption frequency was significantly associated with internalizing and externalizing disorders. A significant association was also found between duration of consumption and externalizing disorders.***

Keywords: Adolescents, mental health, fast food

1. Introduction

Adolescence is defined by World Health Organization as "a period of human growth and development that occurs nominally between the ages of 10 and 19" [1]. This is a critical stage for physical and psychological well-being; therefore, promoting mental health during this stage is crucial [2].

Mental health disorders are described as "a dysregulation of mood, thought, and/or behavior." as recognized by the Diagnostic and Statistical Manual, 4th edition, of the American Psychiatric Association (DSM-IV) [3]. These disorders are divided into internalizing problems, such as anxiety and depression, and externalizing problems, such as attention deficit hyperactivity disorder and conduct disorders which may be range from normal behavior to issues that warrant a clinical diagnosis [4].

The onset of serious mental illness like depression and psychosis occurs predominantly during adolescence. Stress overload from physical, emotional, social, and sexual changes can result in anxiety, withdrawal, aggression, poor coping skills, and actual physical illness [5]. The World Health Organization estimates that 10-20% of children and adolescents worldwide have mental disorders. Half of all mental illnesses begin by the age of 14 and three-quarters by the mid-20s [6]. According to a study conducted in Saudi Arabia, the prevalence of mental illness in secondary school students was 48%. The same study found that more female than male students have psychiatric disorders with significantly severe symptoms (51% and 41%, respectively) [7]. Another national study reported that the high prevalence of psychological illnesses among adolescents was considered one of the main health problems in this age [8].

Healthy development during adolescence requires adequate nutrition intake; however, there is evidence that the diet quality among younger generations has deteriorated [9]. In addition, there is an increasing trend of fast food consumption [10] due to its ready availability, flavor, low price, advertising, peer pressure, [11] and urbanization [12]. This type of food is accountable for many health problems including obesity, hypertension, dyslipidemia, heart disease, diabetes [12], and psychiatric illnesses [13].

A local study done in Riyadh, Saudi Arabia, found that high proportion of adolescent and young adult girls consumed fast food at least once weekly [14]. Moreover, the frequency of fast food consumption (chocolate and sweets) was higher among girls from state schools than private schools, as reported by Musaiger et al. [15].

In 2014, Walther et al. evaluated the nutritional behavior, lifestyle, and mental health of adolescents and young adults and concluded that a healthy lifestyle had a positive influence on well-being, whereas higher consumption of junk food was associated with relatively lower well-being [16]. Likewise, an Iranian study conducted by Zahedi et al. showed that adolescents who consumed junk food daily were more likely to have mental health problems [17]. Another British study by Zahra et al. in 2013 examined the relationship between junk food consumption and irregular eating on mental health. Their results showed significant poor mental health among children eating irregularly and consuming junk food daily [18].

Overall diet quality and mental health were also examined in an ethnically diverse adolescent sample by Kulkarni et al., showing a significant association between eating healthy food with better emotional health and unhealthy food with greater emotional distress [10]. Additionally, in 2016, Sinclair et al. assessed the relationship between diet quality and depressive symptomology and found a strong relationship between a high-quality diet during adolescence and lower depressive symptoms. Similarly, Jacka et al. (2001-2003) found that adolescents who scored higher on healthy diet were less likely to report depression, while those with large consumption of

processed and "junk" foods were more likely to report depression [19,20].

Moreover, some studies have shown that fast food is related to particular mental disorders. In 2010, a cross-sectional study was conducted in Norway by Oellingrath et al. assessing the association between eating patterns and mental health problems for adolescents with ages 12-13 years. They found that children with a highly varied Norwegian diet were less likely to have mental disorders, and those with high scores on a "junk/ready" eating pattern were more likely to show indications of hyperactivity-inattention disorders than did children with low scores on this pattern. Children with high scores on "snacking" eating pattern were more likely to have indications of conduct/oppositional disorders than were those with low scores on this eating pattern. [21] Furthermore, unhealthy behaviors (including fast food consumption) were associated with anxiety, suicidal ideation, and physical aggression among adolescents aged 13-15 years as examined by Rao et al. [22].

Health care professionals should address the harmful effects of fast food consumption on health. Although several studies have been conducted globally regarding the relationship between junk food and physical and mental health, to the knowledge of the researchers, no current national studies have focused on fast food and its relationship to mental health, even though it is a global health concern. The high prevalence of mental health illnesses and the transition of diet in this vulnerable age group (i.e., adolescents) demands these significant problems be investigated. As such, the present study aimed to examine the association between fast food consumption and mental health by identifying fast food consumption habits and assessing mental health among female students attending secondary school in Qatif, Dammam, and Khobar cities in Eastern Province, Saudi Arabia.

2. Methods

A cross-sectional study was performed between December 2017 and May 2018 with 447 Saudi female students aged 15 to 18 years who were randomly selected from high schools in Qatif, Dammam, and Khobar cities in Eastern Province, Saudi Arabia. All female secondary school students were included except pregnant, special-needs, and home schooled/evening schooled students. The students were invited to participate in the study via a mobile messaging application with a link to the self-administered electronic questionnaire which was distributed by their teachers. The consent to participate was ensured in the front page. A total of 30 students from the target population were excluded due to incomplete questionnaires; the remaining 417 participants were included in the study.

3. Research Tools

The anonymous electronic self-administered questionnaire was divided into three parts. The first part collected demographic data, which included age, marital status, family monthly income, parents' occupation, and education level. A family history of violence, personal history of drug/alcohol abuse and smoking, and the situation of living with parents were also included. The second part involved 9 items on fast food consumption taken from a study by Joseph et al. [23] including current consumption, weekly frequency, and duration. Other details about consumption were also included such as place, type of fast food, and preference of selected fast food items, branded fast food, beverages, and fast food over healthy food. The final part involved a mental health assessment using the Strength and Difficulty Questionnaire (SDQ), which is a brief validated behavioral screening questionnaire assessing 25 attributes divided into five sub-scales: emotional symptoms, conduct problems, hyperactivity/inattention, peer relationship problems, and prosocial behavior. The first four sub-scales generate the internalizing score (sum of the emotional and peer problems scales) and externalizing score (sum of the conduct and hyperactivity scales) both ranging from 0 to 20. Internalizing scores of 13 and over are considered abnormal, while externalizing scores of 12 and over are considered abnormal. Further information on coding and scoring is available in the questionnaire website [24]. The independent variables in this study included current fast food consumption, and its frequency and duration. The dependent variables were externalizing and internalizing scores.

4. Data Analysis

The data were analyzed using SPSS version22. Continuous data were presented as means, medians, and standard deviations, and categorical data were presented as frequencies and percentages. Possible confounding variables for which the data were adjusted included family history of violence/mental illness, personal history of drug/alcohol abuse or smoking, and living with parents. Chi-square test was used to determine the association between categorical variables and ANOVA was used for categorical dependent variables. The relationship between mental health problems and significant variables in fast food consumption was determined using the correlation coefficient (r). Linear regression was carried out to identify the predictors of mental health. Significance was set at a $P<0.05$.

5. Results

5.1 Participant Characteristics

As shown in Table 1, about 35% of the participants were 16 years old. The majority of participants (94.5%) were single. About 47% had a monthly family income over 10,000 Saudi Riyal(SR), and14.4% had under 3000 SR. Mothers and fathers of participants completed university education in 39.6% and 44.8% of cases, respectively, and a low percentage were illiterate (2.6% and 2.4%, respectively). Most participants' mothers (65.2%) were jobless, while 67.4% of fathers currently had a job. The majority of the participants (90.4%) were living with both parents, 7.9% were living with either parent, and only 1.7% were not living with their parents. A family history of mental illness was reported by 8.4% of the sample; also 15.3% had a family history of violence. Only 8.9% had a personal history of drug/alcohol abuse or smoking.

5.2 Fast Food Consumption

The majority of the students (76.5%) currently consumed fast food, and 69.5% did so once or twice per week. About 57 % had consume fast food for more than 5years. Home and restaurants were the preferred places for fast food consumption (50.8% and 43.4% respectively). Over half (58%) preferred healthy food over fast food, natural juices over a beverage (78.4%) and non-brand fast food (58.0%) (Table 2). Furthermore, 50% of those who currently consumed fast food had a monthly family income of more than 10,000 SR, although they did so less frequently (once or twice per week). There was a significant association between family monthly income and current consumption of fast food and its frequency.

5.3 Mental Health

Only 7.4% of the studied sample had an abnormal internalizing score. The externalizing score was abnormal in 5.5% of the participants (Table 3).

There was a significant association between internalizing disorder and family history of violence and mental illness ($p<0.05$). About 13% of participants with abnormal internalizing scores had a family history of mental illness, and around 42% had a family history of violence. Moreover, there was a significant association between externalizing disorder and family history of mental illness, personal history of drug/alcohol abuse or smoking, and family income ($p<0.05$). About 9% of the participants with abnormal externalizing scores had a family history of mental illness, and around 26% had a personal history of drug/alcohol abuse or smoking. Among those with abnormal scores, 66% had a monthly family income over 6,000 SR.

5.4 Association Between Mental Health and Fast Food Consumption

As shown in Table 6, a significant association was found between internalizing and externalizing scores on theSDQ and frequency of fast food consumption ($p<0.05$), but the significant correlation was weak ($r=0.07$). Additionally, a significant association was found between externalizing score and duration of fast food consumption, with no significant correlation ($p<0.05$). However, neither of the mental health scores were significantly associated with current fast food consumption (Tables 4 and 5).

A linear regression analysis was carried out to determine the predictors of mental health, with frequency of fast food consumption being the only significant predictor ($p=0.00$) (Table 7).

6. Discussion

During the past few decades, the food consumption patterns have changed in Saudi Arabia along with lifestyle. These changes contribute to many nutrition-related comorbidities, including mental health. In this cross-sectional study, we aimed to examine the relationship between fast food consumption and mental health among female secondary school students aged 15-18 years in the Eastern Province of Saudi Arabia.

6.1 Fast Food Consumption

The present study showed that a significant proportion of participants reported current fast food consumption, with a frequency of once or twice per week. This was similar to another local study conducted in Riyadh, Saudi Arabia, by Alfaris et al. (2015) who observed that a large number of adolescent and young adult Saudi girls consumed fast food at least once weekly [14]. This accentuates the importance of interventions that aim to adjust adolescents' diets and eating practices.

The current study also found that more than half of the sample preferred healthy food over fast food and had consumed fast food for more than five years. Additionally, home and restaurants were the preferred places for fast food consumption, suggesting widespread unhealthy eating habits among this population despite their healthy food preferences.

Many factors can influence fast food consumption; the present study showed a significant association between family income with fast food consumption and its frequency, as it found that half of the fast food consumers had high family income. This finding is in line with a study conducted in India by Aloia et al. [25],who found that higher income groups consume more Western-style fast food, in contrast to other Western studies that show higher fast food consumption among low-income individuals. It is well known that shopping and eating out are the main entertainment activities in Saudi Arabia; hence, consumers from higher-income households can trade up, eat out, and order food more often. Additionally, the rising use of social media and increased travel have exposed a significant proportion of Saudi society to Western culture, which could explain this finding. This study found no significant association between parental education level and fast food consumption, which was also supported by an Iranian study [26]. Another study conducted in China found the same result; however, when the study population was classified according to residency status in rural and urban areas, there was a significant association, with higher parental educational level being associated with healthy eating behaviors of their children in urban areas [27]. The restriction of our study sites to the urban areas may explain our finding. Moreover, there was no significant association between parents' occupation and students' consumption of fast food. This is inconsistent with a previous Iranian study [26].

6.2 Mental Health

The present study found that a minority of the students included in the survey had mental health problems in the form of internalizing and externalizing disorders. This is in contrast to a study conducted in Australia by Trapp et al. (2016) [4] who found that students had a higher percentage of internalizing and externalizing scores (17.4% and 22.7%, respectively). A likely reason for this difference between the two studies is the cultural difference that may affect reporting mental health issues, and the small sample size and limited diversity. It is well known that offspring of parents with

mental illness are at higher risk of mental illness themselves [28]. In this study, there was a significant association between internalizing and externalizing disorders and family history of mental illness, which is supported by the study by Hancock et al. which found that children with higher SDQ scores tended to report mental illness history of either parent [28]. The current study also found a significant association between internalizing disorders and family history of violence. Adolescents targeted by parental violent acts had reduced adjustment and an increased likelihood of mental health problems, as shown in a Finnish study [29]. The living situation with parents and availability of parental emotional support is indeed a factor that affects the mental health of adolescents [30]. On the other hand, there was no significant association between mental health and living situation in this study. A plausible reason for this finding is the low number of participants living with a single parent or neither of them; another reason could be good social support by the community. Moreover, the present study found no significant association between mental health problems and parental education level, which is in line with the results of a study conducted in Spain, which found that parental education was associated with child mental health problems, but no association was observed among adolescents [31]. A possible explanation for our finding could be the high parental education level of most of our participants. Additionally, this study found no significant association between parents' occupation and mental health, in contrast to a Hungarian study that showed that father's unemployment was associated with poor mental health [32]. The fact that the majority of the participants in our sample had employed fathers could explain this finding. Furthermore, lower family economic status had been previously linked to mental illness [33]. Nevertheless, the present study showed a significant association only between externalizing disorders and family income; however, most of the students in our study had middle to high income, unlike a cohort study conducted in Brazil that showed an association between low family income and hyperactivity [34]. Our finding could be explained by the relatively high economic status of a large number of study participants.

6.3 Relationship between Fast Food and Mental Health

This study found an association between frequency of fast food consumption and internalizing and externalizing disorders, even though current fast food consumption showed no association with mental health. Several studies have reported a relationship between unhealthy diet and mental health among of adolescents, such as an Iranian study by Zahedi et al. (2014) that found an association between the frequency of junk food consumption and psychiatric distress [17]. Moreover, another study conducted in East London by Jacka et al. (2012) reported an association between unhealthy food (including fast food) consumption and mental health of adolescents [20]; similar results were also observed in the UK by Zahra et al. (2013) [18]. Furthermore, in the present study, externalizing scores were significantly associated with the duration of fast food consumption, as has been recognized in other studies [4, 21]. This relationship could be explained by the association between eating low-nutrient-density foods and mental problems through the direct impact of diet on inflammatory parameters, immune system markers, and biomarkers of oxidative stress responsible for mental issues[35]. Moreover, unhealthy food components such as simple sugars and saturated fats affect the proteins involved in brain development [35].

7. Conclusion

Overall, our findings demonstrate a positive relationship between fast food consumption frequency and both externalizing and internalizing disorders among female adolescents. Furthermore, the duration of fast food consumption was specifically associated with externalizing disorders.

8. Future Scope

We suggest a community-based nutrition intervention that considers the high frequency of fast food consumption and targets the eating behavior of adolescents and young adult girls. Moreover, adolescents' mental health screening in primary health care settings is essential. We recommend conducting a further longitudinal study to examine the causal and directional relationship between fast food consumption and mental health in adolescents, including a wide range of age groups and both genders at a nationwide level.

9. Strengths and Limitations

The cross-sectional design of the study eliminates the possibility of identifying the causal relationship between adolescents' fast food consumption and mental health. The collected data were self-reported and might thus be affected by recall and social desirability bias. The sample included only female students aged 15-18 years, which limits the generalizability of the study results.

On the other hand, this study used a validated questionnaire, the SDQ and the response rate was optimal. To best of our knowledge, this is the first study to show a relationship between fast food consumption and mental health among adolescents in Saudi Arabia.

10. Ethics approval and consent to participate

Approval from the Ethical Committee of the Post-graduate Saudi Board Program, Eastern Province, was gained before conducting the study. Written consent was obtained from all participants who agreed to participate in the study.

11. Data Access and Retention

The datasets used and analyzed in the current study are available from the corresponding author upon reasonable request.

12. Competing interests

There are no conflicts of interest to declare.

13. Funding

The authors did not receive funding from any external sources.

14. Authors' Contributions

Ghadeer Alsaffar, Sharifah Alghamdi, and Haifa Almahasnah are the corresponding authors; Maha Eltwansi is the supervisor who participated in writing the Results and the Discussion.

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Table 1: Sociodemographic data of participants

		Frequency (N=417)	Percentage (%)
Age in years	15	73	17.5
	16	144	34.5
	17	110	26.4
	18	90	21.6
Marital status	Single	398	95.4
	Married	19	4.6
Family income	<3000	60	14.4
	3000-6000	71	17
	6000-10000	92	22.1
	>10000	194	46.5
Mother's educational level	Illiterate	11	2.6
	Elementary	38	9.1
	Intermediate	68	16.3
	High school	135	32.4
	University	165	39.6
Father's educational level	Illiterate	10	2.4
	Elementary	41	9.8
	Intermediate	58	13.9
	High school	121	29
	University	187	44.8
Mother's job	Jobless	272	65.2
	Governmental	82	19.7
	Non-governmental	32	7.7
	Retired	31	7.4
Father's job	Jobless	14	3.4
	Governmental	152	36.5
	Non-governmental	129	30.9
	Retired	122	29.3
Family history of mental illness	Yes	35	8.4
	No	382	91.6
Family history of violence	Yes	64	15.3
	no	353	84.7
Personal history of drug abuse/smoking	Yes	37	8.9
	No	380	91.1
Living with parents	Both	377	90.4
	Either	33	7.9
	Neither	7	1.7

Table 2: Distribution of the sample according to fast food consumption

		Frequency (N=417)	*Percentage (%)*
Current consumption of fast food	Yes	319	76.5
	No	98	23.5
Weekly frequency of fast food consumption	Once	164	39.3
	Twice	126	30.2
	Most of the days	105	25.2
	Daily	13	3.1
	More than once daily	9	2.2
Duration of fast food consumption	<1 year	12	2.9
	1-2 years	15	3.6
	2-3 years	42	10.1
	3-4 years	46	11
	4-5 years	66	15.8
	>5 years	236	56.6
Type of fast food	Vegetarian	16	3.8
	Non-vegetarian	401	96.2
Preferred fast food	Samosa	106	25.4
	Pizza	266	63.8
	Burger	249	59.7
	Chocolate	258	61.9
	Other	93	22.3

Preferred place for fast food consumption	Home	212	50.8
	School	24	5.8
	Restaurant	181	43.4
Prefers fast food over healthy food	Yes	177	42.4
	No	240	57.6
Prefers brand fast food	Yes	175	42
	No	242	58
Prefers beverage over natural juice	Yes	90	21.6
	No	327	78.4

Table 3: Total internalizing and externalizing scores

	Frequency(N=417)	Percentage (%)
Total internalizing score		
Normal (0-8)	257	61.6
Borderline (9-12)	129	30.9
Abnormal (13-20)	31	7.4
Total externalizing score		
Normal (0-8)	311	74.6
Borderline (9-11)	83	19.9
Abnormal (12-20)	23	5.5

Table 4: Relationship between fast food consumption and internalizing score

		Internalizing score		
		Mean ± SD	*F*	*P value*
Current consumption of fast food	*Yes*	7.5±3.45	0.058	0.81
	No	7.5±3.30		
Duration of fast food consumption (years)	*<1*	7.1±4.17	0.53	0.754
	1-2	8.0±3.93		
	2-3	6.9±3.99		
	3-4	7.9±3.20		
	4-5	7.3±3.28		
	>5	7.6±3.32		
Weekly frequency of fast food consumption	*Once*	6.8±3.51	5.29	0.000*
	Twice	7.4±2.99		
	Most of the days	8.4±3.37		
	Daily	8.2±3.81		
	More than once daily	10.2±4.02		

Table 5: Relationship between fast food consumption and externalizing score

		Externalizing score		
		Mean±SD	*F*	*P value*
Currently consuming Fast food	*Yes*	6.5±3.13	3.6	0.058
	No	5.9±3.28		
Duration of fast food consumption (in years)	*<1*	5.0±2.63	2.4	0.036*
	1-2	7.5±3.58		
	2-3	5.3±2.88		
	3-4	6.9±2.86		
	4-5	6.3±2.77		
	>5	6.5±3.33		
Weekly frequency of fast food consumption	*Once*	5.7±3.21	5.63	0.000*
	Twice	6.3±2.85		
	Most of the days	7.1±2.96		
	Daily	8.1±4.68		
	More than once/days	9.1±3.05		

Table 6: Correlation between externalizing and internalizing scores and significant variables

Correlation between internalizing score and significant variables		
	r	*P value*
Frequency of fast food consumption	0.222	**0.000***
Duration of fast food consumption	0.060	0.223

Correlation between internalizing score and significant variable		
	r	*P value*
Frequency of fast food consumption	0.206	**0.000***

Table 7: Liner regression for prediction of fast food consumption frequency to externalizing and internalizing score

	Externalizing score				***Internalizing score***			
	B	Std. error	t	Sig.	B	Std. error	t	Sig.
Weekly Frequency of consumption	0.753	0.154	4.888	0.000	0.744	0.167	4.465	0.000