









The Impact of Social Media Influencers on Food Consumption in Saudi Arabia, a Cross-Sectional Web-Based Survey

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Background: Previous studies investigating the impact of social media influencers on food consumption are limited. Therefore, this study explores the influence of social media on people's health choices to understand the consequences of food consumption among the Saudi community.

Patients and Methods: A cross-sectional study using an online survey was conducted in Saudi Arabia between 24 June and 20 July 2021. A convenience sample of eligible participants was used to recruit the study participants. A 32-items questionnaire was distributed via social media platforms (Facebook, Twitter, Snapchat, and Instagram). In addition, significant predictors of people being affected by social media to change diet and living with obesity were determined using binary logistic regression.

Results: A total of 1124 participants were involved in this study. More than half of them (57.8%) were females and aged below 40 years (57.4%). The study participants' median body mass index (BMI) was 27.4 kg/m² (IQR: 23.5–32.5). Around one-third of the study participants (36.6%) reported following influencers on social media. The median attitude score for the study participants was 15.00 (IQR: 1.00–27.00) out of 72, equal to 20.8%, which highlights that social media influence the diet of around one-fifth of the study participants. Males were less likely to be affected by social media than females (OR: 0.51; 95% CI: 0.40–0.65). Participants with obesity and participants who had tried a diet to lose weight were more likely to be affected by social media, with odds ratios of 2.14, and 4.83, respectively. Followers of social media influencers were 10-folds more likely to be affected by social media than others.

Conclusion: This study showed that social media might influence the food consumption manner in the Saudi population.

Keywords: social media, obesity, food consumption, Saudi Arabia, Twitter, Snapchat

Introduction

Food consumption is one of the most vital daily practices that affect the performance of the entire human body throughout the day.¹ Various external factors influence this practice, and social media significantly affects technology and new trends.² For example, social media is defined as

Internet-based channels that allow users to interact opportunistically and selectively self-present, either in real-time or asynchronously, with both broad and narrow audiences who derive value from user-generated content and the perception of interaction with others.³

In 2019, the General Authority for Statistics released the Saudi Youth Development Survey results. The survey showed that about 67% of the Saudi population were between 0 and 34 years, and the age group 15–34 years old were accounted for almost 37% of the total population (51.03% and 48.97% for males and females, respectively). The survey's results showed that 98.43% of them had accounts on social networking sites.⁴

The use of social media is increasing in developing countries. In 2021, almost 4 billion people are using social media worldwide, a two-fold increase since 2015.⁵ In Saudi Arabia, 68% of the Saudi population were active on social media in 2019.⁶ Saudi Arabia is among the top countries to use Twitter worldwide.⁷ Twitter is one of the most widely used social media platforms today, and it is becoming a very common data source platform, including health related research.⁸ The way social media is changing the food habits of people is through advertisements, news, and posts on different platforms.⁹ Social media influencers can be defined as famous content creators with many followers, promoting products and services to inspire others.¹⁰ Influencers on social media represent new, independent external advocates who shape audience behavior through posts, blogs, and tweets.¹⁰ The popularity of a social media influencer depends on a more favorable attitude among their followers toward purchasing products and brands advertised by the influencer.¹¹ In Saudi Arabia, social media influencers mainly promote restaurants that serve high-energy-dense food rather than restaurants serving low-energy-dense food.¹²

Obesity is a significant health concern worldwide, and the number of people suffering from obesity is growing worldwide, with more than 1.9 billion (39%) of adults overweight in 2016.¹³ Obesity is often associated with a higher risk for developing metabolic syndromes including hypertension and diabetes.¹⁴ However, it is also associated with other morbidities and poor outcomes.¹⁵ Obesity in the Gulf region has long been an issue due to generally unhealthy food habits, especially in Saudi Arabia.¹⁶ For example, Saudi Arabia has obesity (BMI \geq 30) prevalence of 24.7%, of which 10.2% also suffer from Type 2 Diabetes Mellitus.¹⁷ Obesity is mainly associated with diabetes mellitus, coronary heart disease, sleep disorders, and some forms of cancer.¹⁸ The global obesity crisis stems from genetic susceptibility, a heavy decrease in the requirement for physical activity, and abundant availability of high-energy foods.¹⁹

The use of social media is associated with eating disorders and negative body images, which mainly affect young users.²⁰ A higher negative body image and unhealthy food decisions have been linked to social media image-related interactions between young adults influenced by social media.²¹ In addition, watching videos posted by social media influencers on various social media platforms could lead to a future health crisis that significantly impacts the younger generation's health, this could be due changes in the eating behavior, eating timing and also sleeping hours.²²

Over the past decade, social media has allowed internet users to interact on unlimited topics, including health and weight management. However, with the continued growth of social media and its expanding impact, it is vital to understand how social media impacts eating disorders. For example, people can easily be influenced by social media posts without realizing it when making food-related decisions. The association between watching blogs or social media and unhealthy dietary patterns has not been studied. Therefore, this study explores the effects of social media on food consumption and obesity in the Saudi population.

Materials and Methods

Study Design and Study Population

A cross-sectional study using an online survey was conducted in Saudi Arabia between 24 June and 20 July 2021. Participants aged 18 years and above and living in Saudi Arabia were eligible to complete the survey.

Sampling Strategy

A convenience sample of eligible participants was used to recruit the study participants. Participants were invited to participate in this study through social media (Facebook, Twitter, Snapchat, and Instagram). The study sample was invited using a survey link. All participants voluntarily participated in the study and were thus considered exempt from written informed consent. Study aims and objectives were clearly explained at the beginning of the invitation letter of the survey.

The inclusion criteria were participants aged 18 years and above and living in Saudi Arabia.

Questionnaire Tool

This study adapted and used a previously validated questionnaire.²³ To achieve the study's aim, a 32-item questionnaire was distributed. It is comprised of two sections. The first section (14 items) asked the participants about their socio-demographic characteristics. The second section (18 items) explored the impact of social media influencers on food consumption. Each item in the second section was scored using a five-point Likert scale that ranged from zero (never) to four (very often). The total possible score for this scale ranged from 0 to 72. We interpreted the participants' score based on the mid-point of the highest possible score of the scale (equal to 36). The lower the score, the less likely the participant was affected by social media changing their dietary habits.

Questionnaire Validity and Reliability

The questionnaire tool's reliability and validity were previously investigated among 247 Turkish university students. By using Lawshe's method and contacting eight experts with at least five years of experience and a background in nutrition and dietetics, the content validity index and content validity ratio were evaluated. There are thirty-eight items in the item pool. Confirmatory Factor Analysis was used to assess the validity of the constructs and the theoretical framework. The Cronbach's alpha value and Spearman-Brown coefficient were noted for the reliability component. It was assessed whether or not the total score could be determined based on the results of the Tukey non-additivity test. 27% of the sample's top and lowest total scores were compared using an independent samples *t* test to look into item discrimination. The original scale's overall reliability coefficient was determined to be 0.928.

Sample Size

The target sample size was estimated based on the WHO recommendations for the minimal sample size needed for a prevalence study.²⁴ Using a confidence interval of 95%, a standard deviation of 0.5, a margin of error of 5%, the required sample size was 385 participants from each study population.

Ethical Statement

The Research Ethics Committee approved this study at Umm Al Qura University, College of Medicine.

Statistical Analysis

Data were analyzed using Statistical Package for Social Science (SPSS) software, version 27 (IBM Corp, Armonk, NY, USA). Categorical variables were reported as frequencies and percentages. A binary logistic regression determined significant predictors of people being affected by social media to change diet and living with obesity. The median participants' scores (15.00 (IQR: 1.00–27.00)) were used as a cut-off point to identify the dummy variable for the logistic regression analysis and to identify participants who were more likely to be affected by social media in terms of changing their diet. A confidence interval of 95% ($P < 0.05$) was applied to represent the statistical significance of the results, and the level of significance was predetermined as 5%.

Results

Study Participants' Characteristics

A total of 1124 participants were involved in this study. More than half of them (57.8%) were females and aged below 40 years (57.4%) (Table 1). Around 47.0% of them reported that they had a bachelor's degree. In addition, 97.1% of the participants reported living in an urban area. More than half of them (66.2%) were married. The study participants' median BMI was 27.4 kg/m² (IQR: 23.5–32.5). Only 23.2% of the study participants reported exercising regularly (3–4 times a week). Most of the study participants (79.7%) reported trying a diet to lose weight for one year. Around one-third of the study participants (36.6%) reported that they follow influencers on social media, such as celebrities, coaches, and athletes, while 29.5% reported that they sometimes follow social media influencers.

Table 1 Demographics Characteristics of the Study Participants

Demographic Characteristics	Overall (Frequency (%))	Non-Obese Participants (Frequency (%))	Obese Participants (Frequency (%))
Gender			
Female	650 (57.8%)		
Age category (years)			
18–22 years	135 (12.0%)	99 (73.3%)	36 (26.7%)
23–29 years	134 (11.9%)	85 (63.4%)	49 (36.6%)
30–40 years	377 (33.5%)	133 (35.3%)	244 (64.7%)
41–50 years	240 (21.4%)	52 (21.7%)	188 (78.3%)
51 years and over	238 (21.2%)	56 (23.5%)	182 (76.5%)
Education level			
High school	236 (21.0%)	109 (46.2%)	127 (53.8%)
Diploma	68 (6.0%)	23 (33.8%)	45 (66.2%)
Bachelor degree	527 (46.9%)	198 (37.6%)	329 (62.4%)
Higher education	293 (26.1%)	95 (32.4%)	198 (67.6%)
Which of the following best describes the area in which you live?			
Rural area	33 (2.9%)	13 (39.4%)	20 (60.6%)
Urban area	1091 (97.1%)	412 (37.8%)	679 (62.2%)
Marital status			
Married	744 (66.2%)	214 (28.8%)	530 (71.2%)
Widowed	18 (1.6%)	5 (27.8%)	13 (72.2%)
Divorced	70 (6.2%)	19 (27.1%)	51 (72.9%)
Single	292 (26.0%)	187 (64.0%)	105 (36.0%)
BMI (Median (IQR)) (Kg/m²)	27.4 (23.5–32.5)		
Do you exercise regularly (3–4 times a week)?			
Yes	261 (23.2%)	110 (42.3%)	151 (57.7%)
No	444 (39.5%)	151 (34.1%)	293 (65.9%)
Sometimes	419 (37.3%)	164 (39.1%)	255 (60.9%)
Have you ever tried a diet to lose weight?			
Yes	650 (57.8%)	190 (29.3%)	460 (70.7%)
How often do you go on a diet to lose weight over the course of one year?			
Very often	98 (8.7%)	25 (25.9%)	73 (74.1%)
Most of the time	101 (9.0%)	33 (33.0%)	68 (67.0%)
From time to another	407 (36.2%)	114 (27.9%)	293 (72.1%)

(Continued)

Table 1 (Continued).

Demographic Characteristics	Overall (Frequency (%))	Non-Obese Participants (Frequency (%))	Obese Participants (Frequency (%))
Rarely	290 (25.8%)	115 (39.5%)	175 (60.5%)
Never	228 (20.3%)	139 (60.8%)	89 (39.2%)
Do you follow influencers on social media? (A social media influencer is an individual who can reach a large audience and can persuade others by virtue of their credibility and resources (this includes celebrities, coaches, athletes, etc.)			
Yes	411 (36.6%)	184 (44.8%)	227 (55.2%)
No	381 (33.9%)	130 (34.0%)	251 (66.0%)
Sometimes	332 (29.5%)	112 (33.6%)	220 (66.4%)

The Influence of Social Media on Diet Consumption and Obesity

Our data shows participants’ responses to items measuring their attitude towards social media (Table 2). The median attitude score for the study participants was 15.00 (IQR: 1.00–27.00) out of 72, which is equal to 20.8%. This highlights that social media influences the diet of around one-fifth of the study participants. Using the median score as the cut-off point for being influenced by social media, we (found that males were less likely to be affected by social media than females (OR: 0.51; 95% CI: 0.40–0.65). The participants’ age was negatively associated with their attitudes towards social media and their diet. Bachelor’s degree holders were the most affected by social media (OR: 1.63; 95% CI: 1.31–2.05) compared to participants with lower education. Singles were more likely (OR: 1.79; 95% CI: 1.37–2.34). Participants with obesity and participants who exercised regularly and had tried a diet to lose weight were more likely

Table 2 Participants Response to Items That Measure the Impact of Social Media Towards Eating Attitude

Item	Very Often	Most of the Time	From Time to Another	Rarely	Never
1 How likely are you to try a diet promoted by a social media influencer?	5.5%	8.6%	24.0%	35.4%	26.5%
2 How likely are you to recommend a diet that a social media influencer promotes to friends and/or acquaintances?	3.3%	8.4%	24.6%	32.7%	31.1%
3 Did you buy a food product that was promoted by a social media influencer/celebrity?	3.2%	5.1%	17.2%	24.4%	50.1%
4 When I use social media, I forget that I am hungry.	4.7%	10.9%	30.8%	27.0%	26.5%
5 I consume any food on social media even if it is not my eating habit.	2.1%	6.7%	18.8%	32.6%	39.8%
6 Even though I do not feel hungry, I eat food/plate of foods I watch on social media.	3.2%	7.2%	19.4%	33.3%	36.9%
7 When I see food/dish/nutrition content on social media, I read the entirety of the story.	6.6%	17.4%	32.0%	26.5%	17.3%
8 I think the foods shared on social media are more beneficial for health.	1.1%	5.5%	22.2%	35.8%	35.3%
9 When I see a dish on social media, I search for the recipe and its content.	6.2%	14.5%	33.7%	26.4%	19.2%
10 After I started using social media, my consumption of fast food increased.	4.7%	10.3%	18.8%	22.9%	43.4%

(Continued)

Table 2 (Continued).

Item	Very Often	Most of the Time	From Time to Another	Rarely	Never	
11	I follow nutrition-related content, blogs, and posts on social media.	5.2%	12.1%	29.8%	28.8%	24.1%
12	I eat/cook/buy the foods I watch on social media effortlessly.	3.5%	10.2%	27.7%	33.3%	25.4%
13	I organize my diet according to the photos/videos of foods I see on social media.	1.6%	5.8%	18.0%	29.9%	44.7%
14	I constantly snack when browsing social media and realize how much I ate later.	3.3%	9.2%	21.2%	28.4%	38.0%
15	I care about the foods/dishes that celebrities share on social media, and I consume them.	1.4%	4.2%	15.6%	26.8%	51.9%
16	I think the foods/dishes that get more likes/shares on social media are healthier.	1.2%	3.5%	14.6%	28.4%	52.3%
17	Foods/Dishes I see on social media make me want to eat more.	7.8%	15.6%	28.7%	24.4%	23.6%
18	On the days when I use social media for a long time, my desire to eat increases and I eat more	4.8%	10.9%	22.4%	25.1%	36.7%

to be affected by social media with odds ratios of 2.14, 3.07, and 4.83, respectively. Followers of social media influencers were ten times more likely to be affected by social media than others (Table 3).

On the other hand, the binary logistic regression results showed that being a male is more likely to be associated with living with obesity (OR: 1.89; 95% CI: 1.47–2.43). The age was associated with more odds of living with obesity, with

Table 3 Binary Logistic Regression

Item	Odds Ratio of Being Affected by Social Media (95% CI)	Odds Ratio of Being Obese (95% CI)
Gender		
Female (Reference group)	1.00	1.00
Male	0.51 (0.40–0.65)***	1.89 (1.47–2.43)***
Age category		
18–22 years (Reference group)	1.00	1.00
23–29 years	2.14 (1.46–3.13)***	0.45 (0.31–0.66)***
30–40 years	1.50 (1.18–1.92)**	1.87 (1.46–2.40)***
41–50 years	1.40 (1.06–1.86)*	3.86 (2.77–5.36)***
51 years and over	0.88 (0.67–1.17)	3.40 (2.46–4.70)***
Education level		
High school (Reference group)	1.00	1.00
Diploma	0.84 (0.52–1.38)	1.72 (1.03–2.87)*

(Continued)

Table 3 (Continued).

Item	Odds Ratio of Being Affected by Social Media (95% CI)	Odds Ratio of Being Obese (95% CI)
Bachelor degree	1.63 (1.31–2.05)***	1.79 (1.43–2.25)***
Higher education	1.43 (1.10–1.86)**	2.09 (1.59–2.75)***
Which of the following best describes the area in which you live?		
Urban area (Reference group)	1.00	1.00
Rural area	0.66 (0.33–1.31)	0.39 (0.30–0.51)***
Marital status		
Married (Reference group)	1.00	1.00
Widowed	1.77 (0.65–4.81)	2.24 (0.80–6.33)
Divorced	1.52 (0.93–2.50)	2.39 (1.40–4.10)**
Single	1.79 (1.37–2.34)***	0.39 (0.30–0.50)***
BMI		
25 Kg/m ² and lower (Reference group)	1.00	
Over 25 Kg/m ²	2.14 (1.71–2.68)***	
Do you exercise regularly (3–4 times a week)?		
No (Reference group)	1.00	1.00
Yes	3.07 (2.24–4.21)***	1.20 (0.90–1.61)
Have you ever tried a diet to lose weight?		
No (Reference group)	1.00	1.00
Yes	4.83 (3.80–6.14)***	3.47 (2.75–4.39)***
Do you follow influencers on social media? (A social media influencer is an individual who can reach a large audience and can persuade others by virtue of their credibility and resources (this includes celebrities, coaches, athletes, etc.)		
No (Reference group)	1.00	1.00
Yes	9.50 (6.89–13.08)***	1.07 (0.84–1.37)
Being affected by social media (score of 15 and above):		
No		1.00
Yes		2.20 (1.76–2.75)***

Notes: *p<0.05, **p<0.01, ***p<0.001.

Abbreviations: CI, confidence interval; kg, kilogram; m, meter.

participants aged 51 and older having higher odds of living with obesity, 30–40 years (OR:1.87; 95% CI:1.46–2.40), 41–50 years, (OR: 3.86; 95% CI: 2.77–5.36) and 51 and older (OR: 3.40; 95% CI 2.46–4.70). Divorced participants were more likely to be living with obesity (OR: 2.39; 95% CI: 1.40–4.10), while being single was associated with fewer odds

of being living with obesity (OR: 0.39; 95% CI: 0.30–0.50). Participants who have tried a diet to lose weight were more likely to be living with obesity (OR: 3.47; 95% CI: 2.75–4.39).

Participants affected by social media were more likely to be living with obesity (OR: 2.20; 95% CI: 1.76–2.75) (Table 3). Overall, this result might suggest the link between being obese and being affected by social media.

Discussion

In this study, we conducted a cross sectional online based survey to investigate the impact of social media on food consumption and obesity. We found that the median attitude score for the study participants was 15.00 (IQR: 1.00–27.00) out of 72, equal to 20.8%, which highlights that social media influence the diet of around one-fifth of the study participants. A previous study in Australia, concluded that they found a clear pattern of association between social media use and eating disorders among grade 7 and grade 8 of adolescents.²⁰ The authors of the study reported that more social media accounts were associated with higher eating disorders.²⁰ Similarly, another study in the United States (US) that were conducted on a large cohort of grade eight and eleven of students reported that adolescents who used media for longer hours were associated with a higher odds of unhealthy food and inadequate sleep.²² However, we were unable to compare our results with data from the middle east as found no previous research that were conducted in the Middle East, and we urge for further studies to be conducted.

In our study, males were less likely to be affected by social media than females (OR: 0.51; (95% CI: 0.40–0.65). This was also similar to a previous study in Australia as they found that greater daily time spent using social media was associated with eating disorders for girls.²⁰ Participants living with obesity and participants who had tried a diet to lose weight were more likely to be affected by social media, with odds ratios of 2.14, and 4.83, respectively. Followers of social media influencers were 10-folds more likely to be affected by social media than others.

Developing a negative body image increases eating disorders, including dieting, bingeing, fasting, calorie counting, and self-induced vomiting, which eventually lead to long-term side effects.²⁵ Moreover, social media exposure increases anxiety among users, which leads to emotional over-eating.²⁶ Specifically, maladaptive usage of Facebook has been associated with bulimic symptoms, over-eating, and body dissatisfaction.²⁷ The issue is that social media content is not regulated nor intensively monitored; therefore, people are exposed to misleading information daily.

Most of the influential social media accounts have many followers. They promote products and lifestyles and share their perception of health and body image messages, often incompatible with health promotion.²¹ In this study, 36% of participants followed influencers on social media such as celebrities, coaches, and athletes. Moreover, one-fifth of the study participants were influenced by social media when making food-related decisions. Social media influencers can persuade their audience to purchase products, join movements, follow their advice, and shape attitudes and behaviours.^{28,29} In addition, food advertising on social media works through various mechanisms. For instance, the influencer marketing technique involves the promotion and selling of products or services through social media personalities (“influencers”) who can affect the character of a brand.³⁰ The sight of food provokes various brain responses related to preparation for food and the desire to eat.³¹ In addition, food advertisements are powerful, and brain reactivity to visual food cues has been shown to predict future weight gain and snack consumption in adolescents.^{32,33} Food marketing has convincingly demonstrated that exposure to social media depicting unhealthy products, such as sugar, fast food, and snacks, is directly correlated with high consumption among children and adults.^{34–40} Coates et al reported that social media influencer marketing increases children’s immediate intake of the promoted snack relative to an alternative brand.⁴¹

Although most of our study participants held a bachelor’s degree or higher (46.9% and 26.1%, respectively), this seemed to make them more liable to fall for false or misleading information shared by social media influencers and other advertisers. In addition, our study also showed that females were more likely to be affected by the influence of social media. This may also be explained by the gender variation in psychology in the use of telehealth, social media, and motivation to use, which was also discussed in the literature.⁴² Social media can overwhelm people with contradictory information about healthy food.⁴³ With the amount of information posted daily on social media, it can be challenging for non-experts to distinguish true from false information. For example, our study shows that 26.5% of the study participants rarely read the whole post on social media related to food or nutrition content. This behaviour could give us the insight that when people are unwilling to read the entire post, they will probably not research the given information further. A

small percentage of the participants (5.2%) frequently followed nutrition-related content on social media. In contrast, 10.3% of the participants started consuming fast food most of the time after beginning to use social media. This heavy shift of dietary interest of Saudis towards unhealthy and calorie-dense food will only add to the increasing chronic diseases crisis in the kingdom.

This negative influence of social media on people will exacerbate the increasing issues of obesity and chronic diseases. Obesity is a global health concern, affecting ~650 million adults worldwide.⁴⁴ In 2016, 39% of adults aged 18 years and above (39% of men and 40% of women) were overweight, while about 13% of the world's adult population (11% of men and 15% of women) were living with obesity in 2016.⁴⁵ Overweight and obesity are growing in KSA, especially in females, and they are among the well-known causes of coronary artery disease (CAD).⁴⁶ Obesity was more prevalent among females (female: 33.3%; male: 28.9%) from 1999–2004 in the US.⁴⁷ In our study, participants living with obesity and those who had tried a diet to lose weight were more likely to be affected by social media. Adolescent obesity has been linked with social networks, including and computer/video games.⁴⁸

Health care authorities and health care professionals are warranted to increase their awareness programs to educate the public about the complication of unhealthy food. In addition, the Saudi government must consider reviewing its regulation regarding the advertisement process of food on social media. For example, food, soft drink and energy drinks use artificial intelligent to target and promote for unhealthy food, more regulation and perhaps taxation on these products may benefit the general population. Policy maker should also encourage social media influencers to participate in public health awareness and promotion for healthy food.

Our study has several strong points. First, to the best of our knowledge, this is the first study to investigate the impact of social media on food consumption and obesity in the Middle East. Additionally, we used previously validated assessment tools. However, this study has some limitations. First, this study was cross-sectional in study design. Therefore, we could not confirm any association between the use of social media and food consumption or obesity, and we urge future studies to confirm this association. A self-administered questionnaire through an online platform could be biased. However, owing to the current epidemic and the nature of the objective of this study, we assume that we targeted a well-representative sample.

Conclusion

This study found that social media platforms may have a negative impact on food consumption and obesity. Future studies to investigate this association and factors associated with the negative effect of social media on food consumption are warranted.

Data Sharing Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Ethics Approval and Informed Consent

This study was approved by the Research Ethics Committee at the Faculty of Medicine at University of Umm Al-Qura, Makkah, Saudi Arabia (No. HAPO-02-K-012-2022-06-670). Informed consent was obtained from all subjects involved in the study. The study was designed and conducted in accordance with the ethical principles that have their origin and comply with in the Declaration of Helsinki.

Author Contributions

Conceptualization, Hassan Alwafi and Rakan Ekram; Data curation, Mohammed Samannodi, Reham Alwafi and Hassan Alwafi; Formal analysis, Abdallah Y Naser; Investigation, Mohammed Samannodi, Abdallah Naser and Hassan Alwafi; Methodology, Rakan Ekram and Hassan Alwafi; Project administration, Hassan Alwafi; Resources, Mohammed Samannodi and Hassan Alwafi; Supervision, Hassan Alwafi; Validation, Hassan Alwafi; Writing original draft, Reham Alwafi, Afnan Alqurashi, Faisal Minshawi, Emad Salawati, Abdallah Y Naser and Hassan Alwafi; Writing – review & editing, All authors. All authors contributed to data analysis, drafting or revising the article, have agreed on the journal to

which the article was submitted, gave final approval of the version to be published, and agree to be accountable for all aspects of the work.

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Disclosure

The authors declare no conflicts of interest in relation to this work.

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