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Original article

COVID- 19 outbreak: Does confinement have any impact on weight change perception?



Épidémie de COVID-19 : Le confinement a-t-il un impact sur la perception du changement de poids ?

Chadia Haddad^{a,b,c,*}, Maha Zakhour^d, Ghina Siddik^d, Rima Haddad^e, Hala Sacre^c,
Pascale Salameh^{c,f,g,**}

^a Research Department, Psychiatric Hospital of the Cross, Jal Eddib, Lebanon

^b INSERM, University Limoges, CH Esquirol, IRD, U1094 Tropical Neuroepidemiology, Institute of Epidemiology and Tropical Neurology, GEIST, Limoges, France

^c INSPECT-LB: Institut National de Santé Publique, Epidemiologie Clinique et Toxicologie-Liban, Beirut, Lebanon

^d Faculty of Science, Lebanese University, Fanar, Lebanon

^e Department of Linguistics and Philosophy, Uppsala University, Uppsala, Sweden

^f Faculty of Pharmacy, Lebanese University, Hadat, Lebanon

^g University of Nicosia Medical School, Nicosia, Cyprus

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ABSTRACT

Purpose. – This study aimed to evaluate the relationship between factors related to COVID-19 confinement (i.e., fear of COVID-19, anxiety, anger, boredom, eating disorders, and duration of confinement) and weight perception in a sample of the Lebanese population.

Methods. – A cross-sectional web-based survey carried out at a one-time point between April 3 and 18, 2020, enrolled 407 participants. Due to the imposed lockdown, respondents self-reported their weight and height. One dichotomized question (positive/negative) assessed the perception of weight change (yes = change perception, and no = no change perception). The variation in BMI was calculated by subtracting the estimated weight during confinement from the estimated weight before.

Results. – No significant variation in BMI was detected before and during the confinement ($p = 0.40$), while a perceived weight change was found in 212 (52.1%) participants. The regression analysis showed that higher fear of COVID-19 score ($ORa = 0.96$) and higher self-reported weight change ($ORa = 0.47$) were associated with lower weight change perception. However, longer confinement duration ($ORa = 1.07$), higher anxiety ($ORa = 1.05$), and high eating concerns ($ORa = 1.81$) were associated with higher weight change perception.

Conclusion. – Our results revealed that both the fear of COVID-19 and self-reported weight change were negatively associated with weight change perception, while higher anxiety and a longer duration of confinement correlated with a higher weight change perception. Further studies are necessary to confirm our findings.

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R É S U M É

Objectif. – L'étude visait à évaluer la relation entre les facteurs reliés au confinement dû à l'épidémie de Covid-19 (peur du Covid-19, anxiété, colère, ennui, troubles de l'alimentation et durée du confinement) et la perception du poids dans un échantillon de la population Libanaise.

Méthodes. – Une enquête transversale en ligne a été réalisée entre le 3 et le 18 avril 2020 et a recruté 407 participants. En raison du confinement, les répondants ont déclaré eux-mêmes leur poids et leur

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* Corresponding author. Psychiatric Hospital of the Cross, P.O. Box 60096, Jall-Eddib, Lebanon.

** Corresponding author. Faculty of Pharmacy, Lebanese University, Hadat, Lebanon.

E-mail addresses: Chadia_9@hotmail.com (C. Haddad), pascalesalameh1@hotmail.com (P. Salameh).

taille. Une question dichotomisée (positive/négative) évaluait la perception du changement de poids. La variation de l'indice de masse corporelle (IMC) a été calculée en soustrayant le poids estimé pendant le confinement du poids estimé avant le confinement.

Résultats. – Aucune variation significative de l'IMC n'a été détectée avant et pendant le confinement ($p = 0,40$), alors qu'un changement de poids perçu a été trouvé chez 212 (52,1 %) participants. En prenant le changement de poids perçu comme variable dépendante, les résultats ont montré qu'une peur plus élevée du COVID-19 ($ORa = 0,96$) et un changement de poids ($ORa = 0,47$) étaient associés à une plus faible perception du changement de poids. Cependant, une durée de confinement plus longue ($ORa = 1,07$), une anxiété plus élevée ($ORa = 1,05$) et une préoccupation alimentaire plus élevée ($ORa = 1,81$) étaient associées à une plus grande perception du changement de poids.

Conclusion. – Nos résultats ont révélé que la peur du COVID-19 et le changement de poids auto-déclaré étaient associés négativement à la perception du poids, tandis qu'une anxiété plus élevée et une durée de confinement plus longue étaient corrélées à une perception plus élevée du changement de poids. D'autres études sont nécessaires pour confirmer nos résultats.

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1. Abbreviations

COVID-19	Coronavirus disease 2019
EDE-Q	Eating Disorder Examination–Questionnaire
BMI	Body Mass Index
USD	United States Dollar
SBPS	Short Boredom Proneness Scale
LAS	Lebanese Anxiety Scale
SPSS	Statistical Package for Social Sciences
PAI	Physical Activity Index

2. Background

With the emergence of coronavirus disease of 2019 (COVID-19), people are restructuring their daily lives to adjust to the new normal of social distancing and isolation [1]. To those who endure it, confinement is often an unpleasant experience since it involves separation from loved ones, loss of independence, restriction of movement, an increase of fear and anger associated with a confusion about the state and exits of the disease, and boredom [2]. These factors may often have drastic consequences on mental health, particularly stress and anxiety [2]. The latter is increasing among people as cities self-confine, shops sell merely essential goods, and it becomes increasingly unclear when things might get back to normal [3].

Undoubtedly, a change in daily life routine to a state of self-isolation exacerbates many personal problems with weight, food, and an overall relationship with one's body [4]. During these stressful times, individuals are emotionally vulnerable and face a higher challenge and concern about body image and weight obsession, leading to an overwhelming feeling that goes along other imposed daily changes [5]. Indeed, anxious people are more affected by weight change and weight change perception [6]. Consequently, in response to stress, individuals might fail to accurately identify their actual weight status leading to ineffective weight management [7]. Several studies demonstrate that people fail to acknowledge their actual weight [8–10]. Many people with normal weight misperceive their weight status as overweight, and individuals with overweight or obesity underestimate their body weight status [11]. Weight misperception can negatively affect disordered eating and could modulate eating attitudes and behaviors based on perceived acceptability of the weight [12].

Few studies discussed the perception of weight during the lockdown. Researchers reported that the COVID-19 pandemic appears to increase weight perception in individuals more than

their weight, suggesting an increased risk of eating disorders [13–15]. Keel et al. showed that 28.4% of college students regarded themselves as having gained weight since the beginning of the pandemic, these perceptions being related to increased concerns about weight, shape and eating [13].

People confined to their homes will often try to adapt to their new life away from their usual daily schedule. As a result, they will often turn to food as a necessity to reframe their new lifestyle, which would allow them to face the stressors of confinement and feel a false sense of control [16]. Studies showed how eating disorders got worse during the lockdown, through binge eating, purging, and exercise behaviors, for example [17]. Different factors contribute to increasing the symptoms of these disorders, such as social isolation, disrupted or decreased feelings of control, change of the relationship with food, social media triggering messages, and low physical activity. The fear of infections tends to increase the feeling of not being in control, sometimes managed by extreme eating behaviors; many will focus on their diet and weight to control their sense of insecurity while others will overeat [2,18]. Overeating can lead to weight gain, especially with low physical activity due to confinement [19]. The lack of direct physical interaction with a supportive environment amplifies people's obsession with fear of weight gain [19,20]. Any minor changes in body weight can lead to significant weight change over time. As the confinement duration remains undetermined in this pandemic, it is likely that weight increases, which can lead to obesity [21]. Studies have shown that individuals with higher Body Mass Index (BMI) are at higher risk for weight gain [22,23]. Thus, frequent proximity to food, unhealthy diet, limited physical activity, and sedentary behavior will contribute to weight change during confinement [19,20]. It is noteworthy that people with eating disorders express more concern during confinement and feel they are not in control. These concerns are often managed either with dietary restrictions or other extreme weight management habits or with episodes of binge-eating [2].

Based on all this information, this study aimed to evaluate the relationship between factors related to COVID-19 confinement (i.e., fear of COVID-19, anxiety, anger, boredom, eating disorders, and duration of confinement) and weight perception in a sample of the Lebanese population.

3. Methods

3.1. Study design and sampling

A cross-sectional web-based survey carried out at a one-time point between April 3 and 18, 2020, enrolled 407 participants from

the general population in Lebanon. A questionnaire survey was posted on social media groups (WhatsApp, Facebook, Instagram) and sent by e-mail to potential participants using the snowball technique. All people over the age of 18 with Internet access were eligible.

3.2. Procedure

The online survey consisted of a link to an internet-based questionnaire on Google forms with closed-ended questions in English and Arabic. Data from completed forms were imported into a Microsoft Excel spreadsheet and analyzed using the Statistical Package for Social Sciences (SPSS) software, version 25. The anonymity of the participants was guaranteed during the data collection process.

3.3. Questionnaire

The questionnaire consisted of two parts and required approximately 20 minutes to complete. The first part assessed the socio-demographic features of the participants, including age, gender, marital status, education level, employment status, living region, and the current value of monthly income, divided into four levels: no income, low income (< 1000 USD), intermediate income (1000–2000 USD), and high income (> 2000 USD).

One dichotomized question (positive/negative) assessed the perception of weight change “do you consider that you have gained or lost weight during confinement”, with two possible answers, yes (change perception) and no (no change perception). The “change perception” meant that participants perceived that they lost or gained weight, while the “no change perception” indicated that their weight remained unchanged.

Due to the imposed lockdown, respondents self-reported their weight and height and were requested to give the best estimate of these values if they were uncertain of their answers. The BMI was calculated by dividing self-reported weight (in Kg) by height (in m²), and the variation in BMI was calculated by subtracting the estimated weight during confinement from the estimated weight before.

The second part of the questionnaire consisted of the following scales:

3.3.1. Fear of COVID-19

Ten questions selected from previous studies were used to assess an individual's current fear of COVID-19 [24–27]. Examples of the asked questions include: “Thinking about COVID-19 makes me feel anxious”, “I feel tense when I think about the threat of COVID-19”, and “I feel quite anxious about the possibility of another outbreak of COVID-19”. All items were measured on a 5-point Likert scale, from 1 (not at all) to 5 (extremely). The total score ranged from 10 to 50. High scores indicated a greater fear of COVID-19 infection. In this study, the Cronbach's alpha value was 0.917. By the time our data collection was completed, a study validating a fear of the COVID-19 scale was published [28], and thus could not be used in this paper.

3.3.2. Short Boredom Proneness Scale (SBPS)

The SBPS is a self-report questionnaire consisting of eight items rated on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree) [29]. Examples given for the asked questions: “I find it hard to entertain myself”, “Many things I have to do are repetitive and monotonous”, “I don't feel motivated by most things that I do” and “Much of the time, I just sit around doing nothing”. The total score ranged from 8 to 56. Higher scores indicated a greater tendency to boredom [29]. Pr. James Danckert, author of the scale,

granted permission to use it in the current article. In this study, the Cronbach's alpha value was 0.912.

3.3.3. Lebanese Anxiety Scale (LAS)

This 10-item self-report scale, recently developed and validated in Lebanon, was created to screen for anxiety [30]. Seven of the items are graded on a 5-point Likert scale (0 = not present to 4 = very severe) and the remaining three, on 4-point Likert scale (1 = almost never to 4 = almost always) [30]. The total score was obtained by summing all the responses, with higher scores indicating higher anxiety [30]. In this study, the Cronbach's alpha value was 0.884.

3.3.4. Anger subscale of the Buss-Perry Scale

The Buss-Perry Scale is a 29-item questionnaire that measures four factors: physical and verbal aggression, anger, and hostility [31]. The anger subscale (8 items) used in this study is graded on a 5-point Likert scale from 1 (extremely uncharacteristic of me) to 5 (extremely characteristic of me) [31], with higher scores indicating a higher anger. In this study, the Cronbach's alpha value was 0.865.

3.3.5. Eating Disorder Examination Questionnaire (EDE-Q)

The Eating Disorder Examination-Questionnaire (EDE-Q) is a 28-item self-reported tool measuring the range and severity of behavioral features of eating disorders [32,33]. It includes four subscales: restraint, eating concern, shape concern, and weight concern. All items are scored on a 7-point rating scale (0–6), with higher scores indicating greater levels of symptomatology [33]. In this study, the Cronbach's alpha values of the four subscales were as follows: restraint subscale (Cronbach's alpha = 0.835), eating concern (Cronbach's alpha = 0.745), shape concern (Cronbach's alpha = 0.902) and weight concern (Cronbach's alpha = 0.824).

3.3.6. Physical Activity Index (PAI)

The physical activity index is a frequently used indicator of physical activity at the population level. It is calculated by multiplying the intensity, duration, and frequency of daily activity [34]. The intensity section included “Sustained heavy breathing and perspiration”, “Intermittent heavy breathing and perspiration, as in tennis” “Moderately heavy, as in cycling and other recreational sports”, “Moderate, as in volleyball, softball”, and “Light, as in fishing”. The duration was divided into four categories: > 30 minutes, 20–30 minutes, 10–20 minutes, and < 10 minutes. The frequency was categorized into 6–7 times per week, 3–5 times per week, 1–2 times per week, a few times per month, and less than once a month. A higher score indicates a higher physical activity.

3.4. Translation procedure

A forward and backward translation was conducted for all the scales except for the LAS-10 already available in Arabic. One translator was in charge of translating the scales from English to Arabic, and a second one performed the back translation. Discrepancies between the original English version and the translated one were resolved by consensus.

3.5. Statistical analysis

Data were analyzed using SPSS software version 25. A descriptive analysis was done using the mean and standard deviation for continuous measures and counts and percentages for categorical variables. Student t-test were used to assess the association of continuous variables with two categories. Chi-square and Fisher exact tests were used to assess the association of categorical variables.

A backward logistic regression was performed, considering the weight change perception as the dependent variable. To eliminate

Table 1
Socio-demographic characteristics of the participants (N=407).

	Frequency	Percentage
Age in years		
Less than 24	130	32.0%
24–28	89	21.8%
28–35	91	22.4%
Over 35	97	23.8%
Gender		
Male	198	48.7%
Female	209	51.3%
Marital status		
Single	305	75.0%
Married	102	25.0%
Education level		
University level	370	90.9%
Secondary level or below	37	9.1%
Household monthly income		
No income	127	31.0%
Lower than 1000 USD	83	20.4%
1000–2000 USD	118	29.1%
Higher than 2000 USD	79	19.3%
Employment status		
Employed	230	56.6%
Unemployed	177	43.4%
Region of residence		
Mont Lebanon	238	58.6%
Beirut	35	8.6%
North	71	17.5%
South	27	6.8%
Bekaa	36	8.6%
Living place		
Rural	162	39.9%
Urban	245	60.1%
	Mean	SD
Length of the confinement in days	26.05	10.69
BMI before confinement (Kg/m ²)	25.02	4.69
BMI during confinement (Kg/m ²)	25.08	4.44

potentially confounding factors as much as possible, all variables that showed a $p < 0.1$ in the bivariate analysis were included in the model. A $p < 0.05$ was considered significant. The Cronbach's alpha was used to assess the reliability of the scales.

4. Results

4.1. Sample description

The socio-demographic characteristics of the participants are summarized in Table 1. The results showed that the mean confinement duration was 26.1 ± 10.7 days. The majority (90.9%) had a university level of education and were single (75.0%). Only 92 participants (38.3%) had a sedentary activity. There was no significant variation of the BMI before and during the confinement (M value of the BMI change was: 0.04 ± 1.18 , range: 10.83) ($p = 0.40$). More than half of the sample perceived a change in their weight (212 (52.1%).

4.2. Bivariate analysis: correlates of weight change perception

The bivariate analysis taking the perception of weight change as the dependent variable is shown in Table 2. Participants with weight change perception had a significantly higher mean confinement duration, anxiety, anger, boredom, restraint, eating concern, shape concern, and weight concern, as compared to those with no change weight perception. No significant difference was found between the self-reported weight change (variation in BMI by subtracting the estimated weight during confinement from the

Table 2
Bivariate analysis taking the perception of weight change as the dependent variable.

	Perception of weight change		p-value
	Negative weight change perception (195 (47.9%))	Positive weight change perception (212 (52.1%))	
	Frequency (%)	Frequency (%)	
Gender			
Male	103 (52.8%)	95 (44.8%)	0.106
Female	92 (47.2%)	117 (55.2%)	
Marital status			
Single	147 (75.4%)	158 (74.5%)	0.842
Married	48 (24.6%)	54 (25.5%)	
Education level			
University level	175 (89.7%)	195 (92.0%)	0.433
Secondary or below	20 (10.3%)	17 (8.0%)	
Household monthly income			
No income	65 (33.5%)	62 (29.2%)	0.722
Lower than 1000 USD	36 (18.6%)	47 (22.2%)	
1000–2000 USD	57 (29.4%)	61 (28.8%)	
Higher than 2000 USD	36 (18.6%)	42 (19.8%)	
	Mean \pm SD	Mean \pm SD	
Age	31.32 \pm 10.58	29.91 \pm 9.61	0.160
Self-reported weight change	0.06 \pm 0.34	0.04 \pm 1.61	0.863
Length of confinement in days	24.21 \pm 11.15	27.74 \pm 9.98	0.001
Physical activity index	38.48 \pm 25.51	40.49 \pm 31.45	0.588
Fear of COVID-19 scale	27.68 \pm 8.28	29.23 \pm 9.92	0.087
Anxiety	12.35 \pm 6.86	15.43 \pm 8.22	<0.001
Anger	17.94 \pm 5.75	19.27 \pm 6.17	0.026
Boredom	22.62 \pm 10.91	25.50 \pm 12.41	0.014
EDE restraint	1.09 \pm 1.46	1.44 \pm 1.65	0.025
EDE eating concern	0.65 \pm 0.85	1.40 \pm 1.38	<0.001
EDE shape concern	1.19 \pm 1.18	2.24 \pm 1.83	<0.001
EDE weight concern	0.90 \pm 1.09	1.91 \pm 1.72	<0.001

Values marked in bold are significant ($p < 0.05$).

Table 3
Multivariable analysis.

Model 1: Logistic regression taking the Negative*/Positive perception of weight as the dependent variable				
	p-value	ORa	95% CI	
Length of confinement in days	<0.001	1.070	1.034	1.108
Fear of COVID-19	0.046	0.962	0.927	0.999
Anxiety	0.004	1.078	1.025	1.134
EDE Eating concern subscale	<0.001	1.953	1.466	2.601
Self-reported weight change	<0.001	0.470	0.309	0.715

Variable entered: Length of confinement, Fear of COVID-19 scale, anxiety, physical activity index scale, boredom, anger, EDE restraint subscale, EDE eating concern subscale, EDE shape concern subscale, and EDE weight concern subscale. *Reference group.

estimated weight before) and perception of weight change (participants' perception if they lost or gained weight).

4.3. Multivariable analyses

A backward logistic regression, taking the Negative/Positive weight change perception as the dependent variable, showed that longer confinement duration (ORa=1.07), higher anxiety (ORa=1.05), and higher eating concerns (ORa=1.81) were significantly associated with higher weight change perception. A greater fear of COVID-19 score (ORa=0.96) and higher self-reported weight change (ORa=0.47) were significantly associated with lower weight change perception (Table 3, Model 1).

5. Discussion

To our knowledge, this study is the first to assess the factors correlated with weight change perception during the COVID-19 confinement.

Our results showed that 52.1% had a positive perception of weight change and that there was no significant variation of BMI before and during the confinement, in agreement with previous findings showing that the COVID-19 pandemic affects weight perception more than weight change [13]. Also, a study among 2002 participants from the United Kingdom showed that during the COVID-19 lockdown, 56% of the individuals were snacking more frequently (56%), although others reported a lower snacking frequency (23%) [22]. Additionally, around 40% of them decreased exercising while 45% improved their exercise frequency [22].

Our findings indicate a discrepancy between perceived weight status and reported weight status. Other studies have reported a positive correlation between weight perception and measured weight variation [35–37]. The self-reported weight errors in this study might have underestimated the actual body size, as many individuals tend to underestimate their weight and overestimate their height [38].

Additionally, the absence of self-reported weight variation in our results might be explained by the fact that people are adopting some healthy habits during the lockdown. Evidence suggests that weight variation can be detected 12 weeks after starting a diet and physical activity [39], which does not apply in our study given the short span of confinement (26 days), considered insufficient to detect any effective weight change. Most of our sample had a normal BMI with very few obese, indicating that weight changes might not be noticeable in this group of people. Indeed, studies had found that obese patients reported less exercise, more stress eating, and increased stockpiling of food due to COVID-19 stay-at-home orders, which affects their weight more during quarantine and leads to changes in their BMI [40].

The results of the multivariable analysis revealed that greater fear of COVID-19 was associated with lower weight change perception, while higher anxiety was associated with higher weight change perception. Studies showed that many people experienced higher fear and anxiety reactions that may contribute to weight change by modifying eating habits [41,42]. The association between psychological distress and weight perception is not well identified. Several studies found a directional association that linked weight perception to psychological distress and showed a stronger association between weight misperceptions and anxious/depressive symptoms [43–45]. The reasons underlying the association between the fear of COVID-19, anxiety, and weight perception are still unclear, and cohort studies are needed to confirm causality.

Furthermore, higher weight change was associated with lower perceived weight change, consistent with previous findings showing that a decreased perception of weight gain was more likely to occur among participants with a higher BMI [22]. Other studies conducted before the COVID-19 crisis have found that participants with higher BMI were related to lower weight change behaviors [46–48]. Previous studies reported that individuals with higher BMI do not consider themselves overweight [49,50]. A possible explanation is that during the lockdown, people cannot perform weight-loss behaviors due to barriers to physical activity and healthy eating, which, in turn, affect their body weight by increasing overeating [22].

Our findings revealed that eating concerns are significantly associated with perceived weight change, consistent with other studies showing that people concerned about their body and eating behavior might be very conscious about their body weight [7,51–53]. Consequently, people tend toward unhealthy weight

control behaviors, such as dieting and excessive physical activity, to prevent weight gain [5].

Also, the findings of this study showed that longer duration of confinement was significantly associated with perceived weight change. Previous studies have shown that prolonged confinement might lead to mental health issues [54–56]. However, reactions to self-confinement may vary, and some may adopt new habits and change eating behaviors, which might result in efficient weight perception and maintenance. As the association between confinement duration and weight perception is still unclear, more studies are needed to elucidate it.

5.1. Limitation

This study has several limitations. Its cross-sectional design does not allow us to infer causality. Moreover, the real weight variation of the participants could not be verified, as it was self-estimated. The duration of confinement was probably too short to induce a significant weight change. The perception of weight was assessed using a single question, not a validated scale. The sample may not represent the entire group of confined persons in Lebanon, as the number of respondents is low compared to the total number of confined people.

Furthermore, there is no indication about possible COVID-19 infection among the participants, as this event might impact weight change, perception of weight, fear of COVID-19, anxiety, anger, eating behavior, and physical activity. An information bias could exist since the study questionnaire was online, and answers were self-reported. Self-reported surveys may lead to over or underestimated responses, and respondents may choose to omit or not reveal personal details. A selection bias might have occurred since the sample was not randomly selected but collected using the snowball sampling technique. Participants recruited new people from within their network of friends; thus, all participants are likely to have the same characteristics or traits. The majority of the participants were well educated, computer literate, and had access to the Internet; thus, less-educated people and those with no access to the Internet were not assessed. Residual confounding bias is also possible since there could be factors related to weight perception that were not measured in this study.

6. Conclusion

Our results revealed that both the fear of COVID-19 and self-reported weight change were negatively associated with weight change perception, while higher anxiety and a longer duration of confinement correlated with a higher weight change perception. Furthermore, eating concerns were significantly associated with perceived weight change. Further studies are necessary to confirm our findings.

Ethics approval and consent to participate

The Psychiatric Hospital of the Cross Ethics and Research Committee approved this study protocol (HPC-012-2020). Online consent was obtained from all participants on the first page of the questionnaire.

Consent for publication

Not applicable.

Availability of data and materials

Data can be made available under reasonable request form the corresponding author.

Disclosure of interest

The authors declare that they have no competing interest.

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None.

Authors' contributions

PS, CH designed the study; CH, MZ, and GS drafted the manuscript; CH and PS carried out the analysis and interpreted the results; PS and HS assisted in drafting and reviewing the manuscript; CH, MZ, RH were responsible for data collection; HS and RH edited the paper for English language. All authors reviewed and approved the final manuscript.

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