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Depression, dietary intake, and body image during coronavirus disease 2019 quarantine in Peru: An online cross-sectional study

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Abstract

Objective: The coronavirus disease 2019 affects the psychological well-being of populations. In the same way, it can be a potential threat to body image. The aim of the study was to explore associations between depressive symptoms, dietary intake, and body image during coronavirus disease 2019 quarantine.

Methods: An online cross-sectional study was conducted in 589 Peruvian adults, 297 men (50.4%) and 292 women (49.6%). The mean age was 30.2 ± 9.4 years (range: 18–59 years). Participants completed three questionnaires, including a food frequency questionnaire, the Body Shape Questionnaire, and the Patient Health Questionnaire-9. Moreover, sociodemographic data were collected. The data were analyzed using the statistical software IBM SPSS version 24, and the chi-square test was used. A significance level of 5% was considered.

Results: A total of 37.7% and 43.6% of the women reported depressive symptoms and dissatisfaction with body image, respectively. Depressive symptoms were associated with dietary intake and dissatisfaction with body image ($p < 0.05$). Dissatisfaction with body image was associated with dietary intake ($p < 0.01$).

Conclusions: Depressive symptomatology plays an important role in the dietary intake and body image of the study population. It is suggested to address these factors through the implementation of health campaign programs and personalized therapeutic interventions.

Keywords

Coronavirus disease 2019, depression, eating habits, body image, Peru

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Introduction

The World Health Organization (WHO) declared coronavirus disease 2019 (COVID-19) a health emergency on 11 March 2020, since then it has become one of the public health problems of international concern.[1] The ease with which the disease spreads causes a high number of infected to the point of saturating and collapsing health systems.[2] To mitigate the spread of COVID-19, authorities in several countries, including Peru, introduced blocking measures such as mandatory social distancing and isolation.[3] In Peru, these measures included leaving home only to buy medicine, food, and go to work. While measures may be effective in preventing disease transmission, evidence is nevertheless emerging of the impact of social distancing and confinement on the mental health of populations.[4] The Pan American Health Organization (PAHO) and the Peruvian Ministry of Health have emphasized the impact of the epidemic on the psychological health of the Peruvian population.[5] The fear, stress, and social isolation associated with COVID-19 can contribute to the increased risk of depressive and anxiety symptoms.[6]

Mental health problems caused by the pandemic, coupled with restrictions imposed to slow the spread of COVID-19, can significantly influence dietary intake. Anxious

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people, due to confinement, may opt for unhealthy lifestyle behaviors and behaviors, including alcohol consumption and the consumption of more comforting foods such as snacks and cakes, to better cope with the pandemic situation.[7] For example, the results of an international online survey have shown that participants changed their eating habits toward an unhealthy food consumption pattern.[8] Similarly, findings from a cross-sectional survey conducted online of Polish adults have reported that nearly half reported having eaten and a bit more during the pandemic.[9] Another study revealed that almost half of the participants modified their eating habits; furthermore, 42% of them attributed this increase to a higher prevalence of anxiety.[10] Inadequate dietary habits often coexist with psychological disorders such as depression and anxiety.[11] However, it appears that the COVID-19 pandemic could contribute to the adoption of a healthy lifestyle, including healthy diets, that is, possibly, in an attempt to strengthen your immune system. In fact, in one study, it has been reported that social isolation appears to have led to a quarter of the participants improving their diet, reporting higher consumption of healthy foods, and nearly a third reducing their consumption of sugary beverages.[12] Likewise, Di Renzo et al.[13] reported that 15% of their study participants turned to farmers or organic, buying healthy foods like fruits and vegetables. Evidence from other studies showed that COVID-19 had a great positive impact on eating behaviors and healthy behaviors, leading to an increase in the intake of fruits, vegetables, water, whole grains, legumes, and fish.[14]

Another important aspect to consider is that the COVID-19 pandemic greatly affects and hinders the availability, purchases, and consumption of fresh food. For example, the WHO warns that the limited access to these foods due to the COVID-19 pandemic can lead to a lower consumption of fresh food and a greater purchase and consumption of ultra-processed and prepared foods, which tend to be high in saturated fat, sugar, and salt, which could have a negative effect on the immune system.[15] Also, a cross-sectional online survey conducted among residents of Denmark, Germany, and Slovenia showed that respondents were more likely to increase their consumption of prepared foods, ready-to-eat cereals, sweet snacks, canned foods, and cakes and cookies, while the consumption of fresh foods and fish was more likely to decline.[16] Likewise, apart from observing an increase in the consumption of precooked foods, it seems that the desire to cook among people during the pandemic increased, which consequently increased the consumption of unhealthy foods.[13] Individual choices to cook or buy prepared food more often, aside from stress and mental health issues during the COVID-19 pandemic, could affect eating habits.[7] These factors may be other reasons why people change their eating habits during COVID-19 confinement.

The alteration of body image has become a major health problem that appears from early age to adulthood.[17] Concerns about shape and body weight are widespread among teens and adults.[18] A study has shown that almost half of women aged 25–74 years (48%) and 33.2% of men of the same age reported dissatisfaction with their body image.[19] The alteration of body image could be influenced by various factors such as emotional, sociocultural, including aesthetic standards typical of Western cultures, based on the stereotype of an "ideal body," "tall and thin" for women and muscular for men,[17] which, in the Peruvian reality, does not describe the physical constitution of both women and men.[20] A growing number of studies indicate that body dissatisfaction is associated with poor eating habits[21] and eating disorders anorexia, bulimia, and body dysmorphia.[22,23] In addition, some pre-pandemic reports, particularly in women, have indicated that psychological disorders such as depression and stress are caused by environmental conditions, stressful life events,[24] and anxiety.[25] It is significantly associated with greater body dissatisfaction.

Some studies hint that COVID-19-related psychological disorders could pose a threat to body image.[26,27] On the other hand, recently, some studies have suggested that yes, COVID-19 quarantine-induced mental disorders may be a potential risk factor for body image dissatisfaction.[3,4,28] Therefore, in this study, associations between symptoms of depression, dietary intake, and body image were determined in a sample of adults during the early stages of the national quarantine imposed by the Peruvian government in the context of the COVID-19 pandemic.

Materials and methods

Research design and participants

An online cross-sectional survey was carried out using non-probability convenience sampling. The data were collected from 26 June to 27 July 2020, during the national quarantine decreed by the Peruvian government. A total of 600 people between the ages of 18 and 59 years responded to the call for the study. Participants from the three regions of the country (coast, sierra, and jungle) were considered. Participants older than 18 years and younger than 60 years were included. Seven people who did not meet the age criteria and four who did not correctly answer some questions in the survey were excluded. Therefore, the final sample size of the study was 589. The survey was administered online using a Google form. The data were collected through social networks, such as Facebook Messenger, WhatsApp, and Instagram; also, private email accounts were used. The survey questionnaire is available as supplemental material online. The objective of the study and the purpose of data collection were explained to the participants. Written informed consent was obtained from the participants. Participation was completely voluntary. Participants were not offered any incentives to participate in the study. Furthermore, they were informed that they could withdraw from the study at any time if they so

wished. The study protocol was approved by the Research Ethics Committee of the Universidad Peruana Unión and registered under number 046-2020/UPeU/FCS. The study was conducted in harmony with the Helsinki Declaration.

Food frequency questionnaire

To determine the dietary intake of the participants, a food frequency questionnaire (FFQ) adapted from an FFQ validated in Spanish was used,[29] considering the eating habits of the Peruvian population. It consisted of 18 items that cover 10 food groups, such as fruits, vegetables, Andean cereals, beans, eggs, milk and dairy products, meats, consumption of junk food, fats, and sugary drinks, among other food groups. Each item is made up of five alternatives based on the number of times the consumption is carried out in a given time. The alternatives were classified as follows: daily = 5 points, 2–4 times/week = 3 points, 1 time/week = 1 point, 1–3 times/month = 0.5, and never = 0 points. A score ⩾5 and <5 was considered adequate and inadequate intake, respectively. In addition, some of the answers about whether they ate meat (beef and pork), junk food, and sugary drinks were dichotomous (yes or no). The questionnaire was administered in approximately 5 min.

Body Shape Questionnaire

To assess the body image of the participants, the Body Shape Questionnaire (BSQ) was used. The questionnaire has been validated for use in Spanish.[30] It is made up of 34 items, which are evaluated using a Likert-type scale: (1 = never, 2 = rarely, 3 = sometimes, 4 = often, 5 = very often, 6 = always). Body image dissatisfaction was considered if the score was greater than 105 points.

Patient Health Questionnaire-9

Depressive symptoms were measured using the Patient Health Questionnaire (PHQ-9). In addition, the questionnaire has been validated in Spanish.[31] It is composed of 14 items. A score was defined through nine questions to determine if the participants presented depressive clinical characteristics. A score ⩾10 points was considered positive. This instrument is based on the Diagnostic and Statistical Manual of Mental Disorders, fourth edition (DSM-IV).[32]

Moreover, sociodemographic variables such as age, area of residence, sex (man/woman), place of origin, and level of education were collected.

Statistical analysis

Statistical analyses were performed using SPSS version 26 statistical software package (SPSS Inc., Chicago, IL, USA). To explain the sociodemographic characteristics of the study participants, the distribution of absolute frequencies and percentages was used. A bivariate analysis was performed using the chi-square test to assess the studied population for the presence or absence of depressive symptoms and dissatisfaction with body image. Dissatisfaction with body image and symptoms of depression was represented in the bivariate analysis as dichotomous variables (yes or no). We performed Cronbach's alpha evaluation for the questionnaire on frequency of consumption and the BSQ and PHQ-9 scales. Values of $p < 0.05$ were considered significant.

Table 1. Sociodemographic characteristics of the participants.

Variable	Female (n = 292)		Male (n = 297)	
	n	%	n	%
Age (years), mean (SD)	30.29	9.94	30.22	8.90
Area of residence				
Rural	48	16.4	60	20.2
Urban	244	83.6	237	79.8
Origin				
Coast	113	38.7	108	36.4
Sierra	134	45.9	160	53.9
Jungle	45	15.4	29	9.8
Level of instruction				
Basic	52	17.8	75	25.3
University	240	82.2	222	74.7
Depressive symptoms				
Yes	110	37.7	87	29.3
No	210	70.7	182	62.7
Dissatisfaction with body image				
Yes	115	43.6	109	40.9
No	204	56.4	161	59.1

Results

As mentioned in the "Materials and methods" section, the FFQ consisted of 18 items that span 10 food groups; in this study, Cronbach's alpha of 0.72 was found for this instrument. For the body image scale (BSQ), Cronbach's alpha was 0.68; for depression (PHQ-9), Cronbach's alpha was 0.75.

Between June and July 2020, a total of 600 people voluntarily responded to the online survey. However, seven did not meet the age criteria and four did not answer the survey questions correctly. Thus, the final sample size was 589, of which 297 were men (50.4%) and 292 women (49.6%). The mean age was 30.2 ± 9.4 years (range: 18–59 years). The largest proportion of the participants was urban residents; 82.2% (240) of the university participants were women, and 37.7% and 43.6% of the women reported depressive symptoms and dissatisfaction with body image, respectively (Table 1).

Table 2 shows that the highest proportion of participants with depressive symptoms reported inadequate intake of fruits and vegetables ($p < 0.05$). Depressive symptoms were associated with the consumption of junk food and sugary drinks ($p < 0.05$), clearly showing that the highest proportion of participants who reported depressive symptoms reported

Table 2. Description of the variables of dietary intake and dissatisfaction with body image based on the categories of depressive symptoms.

Variable	Depressive symptoms				X^2	p value
	Yes		No			
	n	%	n	%		
Fruit					15.866	0.003
Adequate	76	38.6	181	46.1		
Inadequate	121	61.4	211	53.9		
Vegetables					6.280	0.017
Adequate	43	21.8	296	75.5		
Inadequate	154	78.2	96	24.5		
Andean cereals					5.484	0.241
Adequate	45	22.9	81	20.6		
Inadequate	152	77.1	311	79.4		
Beans					5.522	0.137
Adequate	101	51.2	198	50.6		
Inadequate	96	48.7	194	49.5		
Egg					0.954	0.917
Adequate	90	45.7	174	44.4		
Inadequate	107	54.3	218	55.6		
Milk and dairy product consumption					6.735	0.151
Adequate	45	22.8	118	30.1		
Inadequate	152	77.2	274	69.9		
Consumption of meat (beef and pork)					3.909	0.418
Yes	132	67.0	270	68.8		
No	65	33.0	122	31.1		
Junk food consumption					10.504	0.033
Yes	122	61.9	187	47.7		
No	75	38.1	205	52.2		
Consumption of sugary drinks					19.903	<0.001
Yes	115	58.4	172	43.8		
No	82	41.6	220	56.1		
Dissatisfaction with body image					65.898	<0.001
Yes	234	48.2	28	28		
No	259	51.8	68	72		

consumption of junk foods and sugary drinks. An association was found between depressive symptoms and dissatisfaction with body image ($p < .001$).

Table 3 describes the bivariate association analysis between dissatisfaction with body image and dietary intake. It was found that the highest proportion of participants who reported dissatisfaction with the image had an adequate intake of fruits, vegetables, Andean cereals, beans, and milk and dairy products ($p < 0.05$). On the other hand, the lowest (47.8%) proportion of participants who manifested body dissatisfaction reported consumption of sugary drinks ($p < 0.05$).

Discussion

The purpose of this study was to identify an association between depressive symptoms, dietary intake, and body image during the first stages of the national quarantine imposed by the Peruvian government for the COVID-19 pandemic. Overall, the results of this study confirm that depressive symptoms are associated with the dietary intake and body image of the participants.

First, women were more likely to report depressive symptoms. The findings of this study are consistent with the results of other studies that have reported the negative impact of confinement caused by the COVID-19 pandemic on women's mental health.[4,33,34] Another set of cumulative epidemiological evidence reported that women were at increased risk for symptoms of depression and were more likely to be anxious.[12,35,36] Research shows that the prevalence of mood disorders such as anxiety, major depressive disorders, and post-traumatic stress disorder is almost twice as common in women compared to men.[37] Although to date the mechanisms of action that support these changes are not fully understood, however, possible explanations could include elevated levels of anxiety and stress as a consequence of greater responsibility for care and concern for health related to COVID- 19.[38] In addition, fear and social isolation associated with COVID-19 can contribute to an increased risk of depressive and anxiety symptoms in people.[6] Moreover, there are some biological mechanisms such as hormonal changes that could lead to the appearance of psychological disorders in women. In fact, the highest prevalence of depression is associated with hormonal fluctuations in women, especially during puberty, before menstruation, after pregnancy, and in perimenopause.[39]

On the other hand, in this study, women reported greater dissatisfaction with body image. This finding reflects results from a pre-pandemic study that found that women were more likely to report greater body dissatisfaction than men,[36] although it is argued that body dissatisfaction is not exclusive to young women. On the other hand, in the context of COVID-19, our results are consistent with findings from other studies showing a negative impact of COVID-19 on appearance concerns.[3] It is possible that these findings reflect the experiences lived by women during confinement caused by the pandemic. Fear of weight gain during confinement due to routine changes and increased social pressure to conform to traditional feminine norms can contribute to women's dissatisfaction with body image. Moreover, findings from other studies[28] suggest that television, magazines, and social networks influence body satisfaction. During the quarantine, the use of social networks, the number of movies and serials viewed, and the time spent reading blogs and fashion magazines have increased significantly.[40] In addition, the internalization of standards of physical beauty on the part of women was caused by the media, which can generate dissatisfaction with their own bodies when they cannot match these standards.[41] In addition, increasingly people claim to have participated in digital events that expose products to change their appearance and to lose weight.[42] Definitely, the social pressure generated by the mass media when spreading the idea that it is important for women to achieve an "ideal of beauty" with

Table 3. Description of the eating pattern variables based on the categories of dissatisfaction with the body image of the participants.

Variable	Dissatisfaction with body image				X2	p value
	Yes		No			
	n	%	n	%		
Fruits					4.597	0.032
Adequate	282	57.3	36	39.3		
Inadequate	211	42.7	60	60.7		
Vegetables					21.234	0.047
Adequate	327	66.4	38	39.4		
Inadequate	166	33.6	58	60.6		
Andean cereals					5.724	0.024
Adequate	102	20.6	72	72.2		
Inadequate	391	79.4	24	27.8		
Beans					14.372	<0.001
Adequate	113	23	45	43.2		
Inadequate	380	77	51	56.8		
Egg					2.126	0.554
Adequate	367	74.5	31	34.9		
Inadequate	126	25.5	65	65.1		
Milk and dairy product consumption					16.401	<0.001
Adequate	447	90.7	9	9.4		
Inadequate	46	9.3	87	90.6		
Consumption of meat (beef and pork)					0.653	0.443
Yes	224	45.4	41	41.7		
No	269	54.6	55	58.3		
Junk food consumption					9.626	0.292
Yes	244	49.5	42	45.7		
No	249	50.5	54	55.3		
Consumption of sugary drinks					14.534	0.048
Yes	233	47.8	52	55.2		
No	260	52.3	44	44.8		

an emphasis on a "slim and tall body" can alter the perception that women have of their own body.[41]

Depressive symptoms and other symptoms such as anxiety are potential risk factors for body dissatisfaction.[36] In this study, depression symptoms were found to be associated with body image dissatisfaction. These findings confirm results from previous studies that perceived stress and anxiety triggered by COVID-19 can pose a unique threat to body image and stressful life events are associated with a negative body image,[26,27] clearly showing that the highest proportion of participants who reported dissatisfaction with the body presented depressive symptoms. A study carried out on UK adults during the first phase of the COVID-19 pandemic "lockdown" found that COVID-19-related stress and anxiety are associated with a negative body image.[3] These results could be due to the fact that routine changes in physical exercise, diet, and sleep impede body image adaptation mechanisms, amplifying maladaptive coping, and greater concern for changes in weight and/or body shape. However, the fact that there are not much empirical data on these issues is almost impossible for both current theorizing and health policy considerations in the face of the pandemic.[3] More studies will be needed to understand the mechanisms that explain these associations; however, it is possible that depression related to COVID-19 diminishes the coping resources to handle threats to body image due to increased exposure to the idea of "ideal bodies" through the media, given a greater screen time during confinement.[43]

The highest proportion of participants with symptoms of depression reported inadequate intake of fruits and vegetables and an increased consumption of junk food and sugary drinks, and foods rich in fats and sugars. The excessive and repetitive consumption of appetizing and tasty foods, especially those rich in fats and sugars, can have negative implications on depression, anxiety, and stress, especially when these foods are no longer available or are not consumed.[44] In addition, the high intake of sugars and fats is associated with an increased risk of these diseases.[45] Instead, people who choose a healthy diet may be less susceptible to mental problems. In fact, findings from a recent study conducted in the context of COVID-19 showed that depression scores were significantly lower in those participants who frequently or

always used a healthy diet compared to participants who never or rarely used it.[46]

On the other hand, it is possible that the social isolation and boredom caused by COVID-19 have negative effects on the diet, which means that there were changes in the caloric intake of meals due to the quantity and quality of the food consumed daily in the period of the pandemic.[47] These meals are characterized by being highly elaborated and with a higher caloric content.[47] It is possible that the trend of inadequate food consumption during COVID-19 is a response to external signals such as depression and anxiety. However, as discussed above, confinement could lead to the adoption of healthy diets. For example, the findings of an online study carried out in the Spanish adult population showed that confinement by COVID-19 favored healthier eating habits.[48] Also, a study carried out in the Italian population during the pandemic showed that 15% of the participants chose to buy organic products and other foods such as fruits and vegetables.[13] Consistent with these findings, one study showed that nearly a quarter of those surveyed improved their diet, opting for healthier food consumption, and nearly a third decreased the consumption of sugary beverages.[12] These findings show that confinement may not necessarily negatively affect eating habits.

Body shape concerns and poor eating habits are major health problems. In general, dissatisfaction with body image and the drive to be thin in both women and men could affect weight control and lead to inadequate dietary intake.[49,50] Studies on the subject conclude that people with a negative body image are more likely to "go to a diet," skip meals, and develop eating disorders.[51] While dissatisfaction with body image has been found to be a predictor of the development of inappropriate eating habits,[52] however, the results of this study indicated that the largest proportion of participants who reported dissatisfaction with the image had an adequate intake of fruits, vegetables, Andean cereals, beans, and milk and dairy products. On the other hand, the lower proportion of participants who expressed body dissatisfaction reported that they did not consume sugary drinks during the COVID-19 pandemic. People who are aware of weight gain during social isolation due to physical inactivity may be more encouraged to turn to healthy foods and cut down on fatty and sugary foods. In fact, previous research[50,51] has shown that being aware of excess body weight is a key factor in attempts to achieve a healthy weight, and this can be achieved through healthy behaviors such as regular physical exercise and a healthy diet. People who are overweight and obese and who consider their weight to be adequate and healthy may not attempt healthy steps to lose weight and may show little interest in choosing a healthy lifestyle that includes healthy eating and regular physical activity.

COVID-19 has led several authorities in different countries of the world to take drastic measures to mitigate the spread of the disease, measures such as confinement, distancing and mandatory social isolation, and the constant use of masks.[53] Despite the importance of these measures in preventing the transmission of COVID-19, however, there is clear evidence that mandatory measures are having negative impacts, affecting various areas of people's health, especially mental health.[4] In this study, the negative impact of the COVID-19 lockdown measure on the mental health of the respondents is notable. Cross-sectional online studies carried out in other countries on the subject have reported similar findings, showing an increase in the rates of psychological disorders, such as depression; for example, results from a web-based survey showed that lockdown measures by the pandemic negatively impacted mental health outcomes.[54] In addition, in a national study that included 1210 respondents in China, it found rates of 30% for anxiety and 17% for depression.[55] Therefore, we argue that these findings can be of great help in driving intervention strategies to improve global mental health related to the COVID-19 pandemic.

Limitations and strengths

Some important limitations of this study must be addressed. These include the fact that the instruments used in the study, although they have been validated in Spanish, have not, however, been validated for use in the Peruvian population. Due to this, we have carried out Cronbach's alpha evaluation for the questionnaire of frequency of consumption and the BSQ and PHQ-9 scales; the results of this test were 0.72, 0.68, and 0.75, respectively. In addition, the study was cross-sectional, not longitudinal; therefore, it limits the possibility of establishing temporality and causality. In addition, although this study provides an overview of depressive symptoms, dietary intake, and body image during COVID-19 quarantine, its findings should not be interpreted in the context of long-term effects. We highly recommend longitudinal studies that explore the associations between depression, dietary intake, and body image. Also, taking into account the anonymous nature and subjectivity in the responses to self-administered online surveys, it is important to take into account possible non-response biases when interpreting the results of this study; furthermore, this should be considered as a limiting factor of representativeness. It is also important to mention that the sample size/power analysis was not performed, which, in turn, may limit the generalizability of the findings. Finally, another limitation of our study is the lack of generalizability of the findings to populations younger than 18 years and older than 60 years.

However, despite these limitations, to our knowledge, this is the first study to explore the associations between depressive symptoms, dietary intake, and body image in the Peruvian population during the COVID-19 pandemic. These findings may be important for nutritional education and health promotion programs, considering that the implementation of programs for the prevention of depressive disorders, dietary intake, and body image is very limited in the Peruvian population. More research is needed in developing countries like Peru, to address the research gap study.

Conclusion

In conclusion, Peruvian adults reported a wide range of changes in their mental health, dietary intake, and body image. The study highlights the prevalence of depressive symptoms and dissatisfaction with body image during the COVID-19 pandemic. An association was found between depressive symptoms and dissatisfaction with body image. The highest proportion of participants with depressive symptoms reported inadequate intake of fruits and vegetables. Depressive symptoms were associated with the consumption of junk food and sugary drinks. Given these results, it is suggested that, as the pandemic continues to evolve, it is important to continue to monitor the psychological well-being and dietary intake of the population. Given that depression can be a potential risk factor for inadequate dietary intake and body image, it is suggested to promote personalized therapeutic interventions and implement health campaigns during the pandemic.

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Author contributions

S.D.L.-P. and B.C.C.-O. were in charge of the project as principal investigators. J.S. participated in the design of the study. Construction of the survey and data collection were assisted by Y.E.C.-M. S.D.L.-P. and B.C.C.-O. wrote the first draft of the article. Y.E.C.-M. and J.S. reviewed and approved the final version of the article.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethical approval

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Informed consent

Written informed consent was obtained from all subjects before the study.

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Supplemental material

Supplemental material for this article is available online.

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