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CLINICAL & BASIC RESEARCH

Knowledge of Coronary Heart Disease Risk Factors among a Community Sample in Oman

Pilot study

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معرفة عوامل الخطر لأمراض القلب التاجية لدى عينة من المجتمع المحلي في عمان

دراسة تجريبية

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abstract: ***Objectives:*** The aim of this study was to assess the knowledge of Omani adults regarding conventional coronary heart disease (CHD) risk factors and to identify demographic variables associated with these knowledge levels. ***Methods:*** This descriptive cross-sectional pilot study was carried out among a convenience sample of 130 adults attending a health awareness fair held in a local shopping mall in Muscat, Oman, in November 2012. A modified version of the Heart Disease Facts Questionnaire in both English and Arabic was used to assess knowledge of CHD risk factors. Scores were calculated by summing the correct answers for each item (range: 0–21). Inadequate knowledge was indicated by a mean score of <70%. Descriptive and multivariate logistic regression analyses were performed to establish the participants' knowledge levels and identify associated demographic variables. ***Results:*** A total of 114 subjects participated in the study (response rate: 87.7%). Of these, 69 participants (60.5%) had inadequate mean CHD knowledge scores. Knowledge of CHD risk factors was significantly associated with body mass index (odds ratio [OR] = 0.739; *P* = 0.023), marital status (OR = 0.057; *P* = 0.036) and education level (OR = 9.243; *P* = 0.006). ***Conclusion:*** Low knowledge levels of CHD risk factors were observed among the studied community sample in Oman; this is likely to limit the participants' ability to engage in preventative practices. These findings support the need for education programmes to enhance awareness of risk factors and prevention of CHD in Oman.

Keywords: Coronary Heart Disease; Knowledge; Risk Factors; Prevention; Oman.

الملخص: أهداف: هدفت هذه الدراسة لتقييم معرفة البالغين العمانيين بعوامل الخطر لأمراض القلب التاجية التقليدية وتحديد المتغيرات الديموغرافية المرتبطة بمستويات هذه المعرفة. **منهجية:** أجريت هذه الدراسة الوصفية المستعرضة على عينة ملائمة من 130 من البالغين الذين يحضرون معرض التوعية الصحية الذي عقد في أحد المراكز التجاريه المحلية في مسقط، عمان، في نوفمبر 2012. تم استخدام نسخة معدلة من "استبيان حقائق أمراض القلب" باللغتين الإنجليزية والعربية لتقييم معرفة العينة بعوامل الخطر القلبية الوعائية. تم احتساب النقاط عن طريق جمع الإجابات الصحيحة لكل بند (المدى: 0–21). تم تحديد الحصول على نقاط أقل من 70% كدليل علي عدم كفاية المعرفة من قبل المشاركين. أجريت تحليلات الانحدار اللوجستي الوصفية متعددة المتغيرات لتحديد مستويات معرفة المشاركين و المتغيرات الديموغرافية المرتبطة بها. **نتائج:** شارك 114 شخص في الدراسة وبلغ معدل الاستجابة 87.7%. من هؤلاء، حصل 69 مشاركا (60.5%) علي نقاط غيركافية مما يدل على عدم المعرفة بأمراض الشرايين التاجية. ارتبطت المعرفة بعوامل خطر الاصابة بأمراض القلب بشكل كبير مع مؤشر كتلة الجسم (نسبة الأرجحية [OR] = 0.739؛ P = 0.023)، الحالة الاجتماعية (OR = 0.057؛ P = 0.036) ومستوى التعليم (OR = 9.342؛ P = 0.006). **خاتمة:** لوحظت مستويات معرفة منخفضة عن عوامل خطر الإصابة بأمراض القلب بين عينة مجتمعية في سلطنة عمان. هذا الإنخفاض المعرفي قد يحد من قدرة المشاركين على الانخراط في الممارسات الوقائية. تدعم هذه النتائج الحاجة إلى برامج تعليمية لتعزيز الوعي بعوامل الخطر والوقاية من أمراض الشرايين التاجية في عمان.

كلمات مفتاحية: مرض القلب التاجي؛ معرفة؛ عوامل الخطر؛ الوقاية؛ عمان.

Advances in Knowledge

- *This is the first study in Oman to highlight deficits in knowledge of coronary heart disease (CHD) risk factors among a community sample of Omani adults.*
- *Several factors—including a high body mass index, low education levels and being married—were associated with low levels of CHD risk factor knowledge among the sample.*

Application to Patient Care

- *The findings of this study contribute to existing knowledge regarding CHD in Oman and should be considered when planning and implementing targeted CHD health education and other preventative measures. Programmes to address the increasing burden of CHD in Oman should take into account the low levels of knowledge of CHD risk factors observed among the Omani community.*
- *The results of this study highlight certain psycho-cognitive factors that require further exploration by healthcare services and researchers to enhance CHD risk factor knowledge and preventative lifestyle behaviours in Oman.*

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Coronary heart disease (CHD) is an increasing worldwide health burden. According to the World Health Organization (WHO), there were 7.4 million deaths due to ischaemic heart disease in 2012, with high-income countries and upper-middle-income countries accounting for 158 and 107 deaths per million, respectively.[1,2] While the prevalence of CHD has stabilised in developed countries, the condition has recently begun to impact developing countries due to increasing life expectancy, urbanisation and lifestyle changes; certain Middle Eastern countries (e.g. Bahrain, Kuwait, Oman, Qatar and the United Arab Emirates) are examples of areas experiencing this epidemiological transition.[3] Modifiable risk factors such as hypertension, diabetes mellitus, hyperlipidaemia, a sedentary lifestyle, obesity and smoking are considered to be the main precursors of CHD.[4]

The increasing trend of CHD and its related risk factors has highlighted the need to strengthen national surveillance schemes and efforts to reduce CHD-related morbidity and mortality. Many countries have implemented a primary prevention approach; however, a key aspect affecting the success of this method is the knowledge of the individuals at risk regarding a specific health problem.[5] Greater knowledge of CHD risk factors helps individuals to correctly assess their personal risk, motivates them to increase prevention-seeking behaviours and has been associated with increased action to lower risks.[6–8] Estimating knowledge of traditional CHD risk factors among a population is therefore crucial in the prevention and treatment of this condition and continues to serve as the baseline for most screening programmes.[9] Inherent psycho-cognitive factors such as the perceived risk of a disease or the importance of behavioural change as well as barriers to the adoption of preventative behaviours or CHD screening may contribute to lack of knowledge.[6,7,10]

The population of Oman is currently approximately four million and life expectancy has recently increased (76.2 years in 2012 versus 73.3 years in 2010).[11,12] Lifestyle changes, including an increase in sedentary lifestyles and a greater caloric intake, have contributed to a rapid rise in the incidence of CHD; diseases of the circulatory system accounted for 32.5% of hospital deaths in Oman in 2012 versus 29.4% of hospital deaths in 2010.[12] The prevalence of diabetes, hypertension and high serum cholesterol levels among Omani adults was 12.3%, 40.3% and 33.6%, respectively, in 2008.[13] Other surveys conducted in Oman have estimated the prevalence rates of overweight individuals, obesity and smoking in adults to be 67.4%, 30.9% and 13.5%, respectively.[14] Despite this threat, awareness and understanding of CHD are low in Oman and there is a significant lack of surveillance data for populations in the Middle Eastern region.[15–17] Recent studies in this region have focused on screening for obesity, dietary patterns and diabetes mellitus.[18–20] There is therefore an urgent need to understand baseline knowledge levels of CHD among the Omani population before designing appropriate and effective interventions to promote awareness. This study aimed to assess the knowledge of Omani adults regarding conventional CHD risk factors and to identify demographic variables associated with these knowledge levels.

Methods

This descriptive cross-sectional pilot study was carried out on a convenience sample of 130 Omani adults attending a health awareness fair held at a large shopping mall in Muscat, Oman, in November 2012. The fair was organised by faculty members of the College of Nursing at Sultan Qaboos University (SQU), Muscat, and provided community awareness activities and services with the goal of increasing public awareness about CHD. Omani adults ≥18 years old who were not disabled or suffering from any medical conditions that prevented them from answering questions and who were not working in the healthcare profession were included in the study. Cohen's table was used to estimate a sample size allowing for the detection of a medium effect with a power of 0.80 and alpha of 0.05 with a regression analysis for seven variables.[21] A sample of 107 participants was thus deemed adequate to ensure a description of variables in a single group and allow the researchers to control for type II errors. The effect size was estimated to be medium to account for the possibility that some participants had previously acquired CHD knowledge while seeking healthcare or from other sources.

In order to assess self-reported knowledge of CHD risk factors, participants were invited to complete the modified version of the Heart Disease Facts Questionnaire (HDFQ).[22,23] The HDFQ was originally designed by Wagner *et al*. to measure CHD knowledge among diabetic patients utilising 25 true/false questionnaire items and has demonstrated good psychometric properties, test-retest reliability (r = 0.89), internal consistency (Kuder-Richardson r = 0.77) and excellent discriminant validity.[22] The modified HDFQ contains 21 items measuring knowledge of CHD risk factors and methods of decreasing CHD risk.[23] Each item on the modified HDFQ scale has three available responses: true, false or unknown. Scores were

Table 1: Demographic characteristics and knowledge of coronary heart disease risk factors* among a community sample of Omani adults (N = 114)

Characteristic	n (%)
Mean age in years (IQR)	37.36 (13.50)
BMI† in kg/m²	
<18.5	2 (2.0)
18.5–24.9	27 (27.3)
25.0–29.9	42 (42.4)
≥30.0	28 (28.3)
Mean ± SD	27.47 ± 4.12
Gender	
Male	72 (63.2)
Female	42 (36.8)
Marital status	
Single	32 (28.1)
Married	82 (71.9)
Education level	
Primary school	10 (8.8)
High school	36 (31.6)
Diploma	26 (22.8)
Baccalaureate degree	30 (26.3)
Graduate degree	12 (10.5)
Employment status	
Unemployed	27 (23.7)
Employed	87 (76.3)
Monthly income in USD†	
<$1,300	46 (46.5)
>$1,300	53 (53.5)
CHD knowledge score	
<69.9%	69 (60.5)
≥70.0%	45 (39.5)
Mean ± SD	13.52 ± 4.59

IQR = interquartile range; BMI = body mass index; SD = standard deviation; CHD = coronary heart disease.

**Knowledge was self-assessed by participants using the modified version of the Heart Disease Facts Questionnaire.[22,23] †Total dataset was 99 due to missing data for 15 participants.*

calculated by summing the correct answers (range: 0–21). Statements with scores of <70% and ≥70% were deemed to indicate low and adequate knowledge, respectively.[22] The modified HDFQ instrument has also shown high internal consistency, with a Cronbach's alpha of 0.84.[23] In this study, the Cronbach's alpha coefficient was 0.86. The questionnaire was administered in both Arabic and English. The Arabic version was independently translated from the English instrument by three different postgraduate nurses who were proficient in both languages. They discussed and agreed on one version which was then back-translated by a bilingual expert. Both the translated and back-translated forms were validated by two bilingual doctorate nurses specialising in cardiovascular care.

The demographic characteristics of the participants were recorded, including age, gender, marital and employment status, level of education and annual income. Body mass index (BMI) was calculated by dividing the participants' weight by their height. Weight was measured to the nearest 0.1 kg with portable digital scales and height was measured to the nearest 0.1 cm with a portable stadiometer. During these measurements, participants were requested to take off their shoes and any heavy clothing and to stand upright. Participants were then categorised according to their BMI as underweight (<18.5 kg/m²), normal (18.5–24.9 kg/m²), overweight (25.0–29.9 kg/m²) or obese (≥30.0 kg/m²), according to WHO standards.[24]

Data were entered into the Statistical Package for the Social Sciences (SPSS), Version 19, (IBM Corp., Chicago, Illinois, USA). Descriptive analyses were conducted and results presented as means ± standard deviation and percentages. A multivariate logistic regression analysis was used to determine the associations between predictive variables (age, gender, BMI, education level, marital status, monthly income and employment) and the dichotomous dependent variable (knowledge of CHD). These results were presented as odds ratios (ORs) and 95% confidence intervals. A P value of <0.050 was considered statistically significant.

This study received ethical approval from the Research & Ethics Committee of the SQU College of Nursing (#CRC/2012/20.9.2012). Individuals who expressed an interest in participating in the study were provided with detailed information about the study's purpose and procedures. Participants were assured that no information pertaining to their identity would be collected. Written consent was obtained from each of the subjects before their participation in the study.

Results

A total of 114 subjects participated in the study (response rate: 87.7%). The demographic characteristics of the participants are presented in Table 1. Participants ranged in age from 18–80 years old. The majority of the participants were male (63.2%). The mean BMI was 27.47 ± 4.12 kg/m² and the majority of the participants were categorised as overweight

Table 2: Levels of accurate* knowledge of coronary heart disease risk factors† among a community sample of Omani adults (N = 114)

Questionnaire item	n (%)
A person always knows when they have CHD	39 (34.2)
If you have a family history of CHD, you are at risk of developing heart disease	68 (59.7)
The older a person is, the greater their risk of developing CHD	81 (71.1)
Smoking is a risk factor for CHD	112 (98.3)
A person who stops smoking will lower their risk of developing CHD	100 (87.7)
High blood pressure is a risk factor for developing CHD	100 (87.7)
Keeping blood pressure under control will reduce a person's risk for developing CHD	101 (88.6)
High cholesterol is a risk factor for developing CHD	97 (85.1)
If your 'good' cholesterol (HDL) is high, you are at risk for heart disease	39 (34.2)
If your 'bad' cholesterol (LDL) is high, you are at risk for heart disease	59 (51.8)
Eating fatty foods does not affect blood cholesterol levels	86 (75.4)
Being overweight increases a person's risk of CHD	100 (87.7)
Regular physical activity will lower the risk of developing heart disease	104 (91.2)
Only exercising at a gym or in an exercise class lowers the risk of developing heart disease	46 (40.4)
Walking and gardening are considered exercise that will help lower the risk of developing heart disease	94 (82.5)
Diabetes is a risk factor for developing CHD	72 (63.2)
High blood sugar makes the heart work harder	66 (57.9)
A person who has diabetes can reduce their risk of developing CHD if they keep their blood sugar levels under control	77 (67.5)
Abdominal obesity is a risk factor for developing CHD	61 (53.5)
Stress may cause an increase in blood sugar, blood pressure and cholesterol levels	72 (63.2)
Slow deep breaths, counting to 10 before speaking and going for a walk are examples of stress inhibitors	73 (64.0)

CHD = coronary heart disease; HDL = high-density lipoproteins; LDL = low-density lipoproteins.

**Using correct responses only. †Knowledge was self-assessed by participants using the modified version of the Heart Disease Facts Questionnaire.*[22,23]

(42.4%). In terms of education level, a large proportion of the participants possessed a diploma qualification or higher (59.6%). A total of 69 participants (60.5%) had CHD knowledge scores <70%, indicating a low level of knowledge. The mean CHD knowledge score was 13.52 ± 4.59 and the mean percentage of correct answers was 64.4%.

Participants showed adequate knowledge of certain CHD risk factors, such as smoking (n = 112; 98.3%), high blood pressure (n = 100; 87.7%), being overweight (n = 100; 87.7%), high cholesterol levels (n = 97; 85.1%) and age (n = 81; 71.1%). The majority also demonstrated adequate knowledge regarding several CHD prevention measures, such as regular physical activity (n = 104; 91.2%), blood pressure control (n = 101; 88.6%) and smoking cessation (n = 100; 87.7%). However, fewer participants demonstrated correct knowledge of other CHD risk factors, including diabetes (n = 72, 63.2%), stress (n = 72; 63.2%), a family history of CHD (n = 68; 59.7%) and abdominal obesity (n = 61; 53.5%). Fewer subjects were aware of high-density lipoproteins (HDL) and low-density lipoproteins (LDL) as risk factors (n = 39; 34.2% and n = 59; 51.8%, respectively). Only 39 participants correctly responded that individuals with CHD might not be aware of their condition (34.2%). While two of the three questionnaire items relating to physical activity were identified correctly by over 80% of the cohort, 59.6% of the participants believed that exercising in a gym or class was the only for of physical actively which lowers the risk of CHD [Table 2].

A multiple logistic regression analysis was performed to predict CHD knowledge. The model fit the data well (Chi-squared value = 23.42, P <0.001; goodness of fit = 6.38, P = 0.609). The only modifiable factor that was significantly associated with knowledge of CHD risk factors was a BMI of ≥25 kg/m^2 (OR = 0.739; P = 0.023), indicating that participants with a BMI of ≥25 kg/m^2 had 73.9% less knowledge than participants with a BMI of <25 kg/m^2. Demographic variables significantly associated with knowledge of CHD risk factors included being married (OR = 0.057; P = 0.036) and having a diploma, baccalaureate or graduate educational qualification (OR = 9.243; P = 0.006). This indicates that married participants had 5.7% less knowledge than unmarried participants and participants with a diploma or higher education level had knowledge scores which were 9.2% higher than those with less education [Table 3].

Discussion

The purpose of this study was to assess knowledge of CHD risk factors and identify demographic variables associated with knowledge levels among a community sample of adult Omanis. The mean score obtained

Table 3: Multivariate logistic regression analysis* of associations between predictive variables and knowledge of coronary heart disease risk factors† among a community sample of Omani adults (N = 114)

Variable	Beta estimate	*P* value	OR	95% CI
Intercept	9.460	0.010	-	-
Age‡	0.041	0.304	1.041	0.964–1.130
BMI of ≥25 kg/m^2	-0.302	0.023	0.739	0.570–0.959
Gender	- 0.621	0.506	0.537	0.086–3.353
Employment	-2.099	0.064	0.123	0.013–1.123
Diploma education or higher	2.224	0.006	9.243	1.872–45.632
Married	-2.871	0.036	0.057	0.004–0.825
Income	0.910	0.259	2.483	0.512–12.056

OR = odds ratio; CI = confidence interval; BMI = body mass index.
**All variables were entered into the model. †Knowledge was self-assessed by participants using the modified version of the Heart Disease Facts Questionnaire.[22,23] ‡Continuous variable.*

on the HDFQ scale by the participants indicated an inadequate level of CHD risk factor knowledge among adult Omanis. Studies from other parts of the world have similarly reported low levels of knowledge and awareness of CHD risk factors.[7,25] A study conducted in Kuwait to assess public knowledge of cardiovascular disease (CVD) risk factors reported similar findings, while another conducted in Jordan reported higher levels of knowledge among their cohort.[15,16]

Smoking, high blood pressure and high cholesterol have been rated as factors posing the greatest risk for CHD.[8] Pereira *et al*. reported that the prevalence, awareness, treatment and control of these risk factors in developing countries are coming closer to those in developed countries.[26] The aggressive nature and consequences of these risk factors have prompted healthcare providers to give them more emphasis whilst advising patients.[27] In the current study, the majority of the participants were familiar with common CHD risk factors, such as smoking, high blood pressure and high cholesterol levels. Awad *et al*. also reported sufficient knowledge levels among their Kuwaiti cohort regarding the risks associated with smoking, obesity, an unhealthy diet and physical inactivity; these similarities could be attributed to the frequent and comprehensive dissemination of information on the ill-effects of these risk factors by various media sources globally.[16,28] However, hypercholesterolaemia, hypertension, diabetes mellitus, stress and a family history of CVD were less frequently identified as CHD risk factors among the Kuwaiti cohort.[16] This may be due to inter-country variations in information provided by the mass media. Health education and guidance are necessary to allow the general population to gain adequate knowledge from reliable sources.[29]

Among the cohort in the current study, the level of knowledge regarding age as a risk factor for CHD was close to the cut-off point designating adequate knowledge, reflecting a limited understanding of age as a non-modifiable risk factor for CHD. Furthermore, while the majority of the participants knew that being overweight increased the risk of CHD, fewer realised that carrying higher levels of abdominal fat imposes the greatest risk. Ford *et al*. noted an increasing prevalence of abdominal obesity in the USA.[30] This may indicate the existence of intra-personal inhibitory factors preventing individuals from instituting measures to address this CHD risk factor. In the current study, levels of knowledge regarding HDL and LDL were low. These scores were consistent with those reported among a sample in India.[31] Additionally, the participants' knowledge of stress, diabetes and a family history of CHD as risk factors was inadequate in the present study. Type 2 diabetes mellitus was found to be an independent risk factor for CVD among individuals of Middle Eastern descent living in Sweden.[20] Fernandez *et al*. noted that the only 46% of their Australian cohort recognised diabetes to be a risk factor for heart disease.[32] Lack of awareness about family history as a CHD risk factor has also been documented in the literature.[33] As a result, the risk factors which were less known to the current study's cohort may be fuelling the prevalence of CHD in Oman; this indicates an urgent need for these factors to be addressed in health education and public awareness campaigns.

In the present study, a BMI of ≥25 kg/m^2 was significantly associated with lower CHD knowledge levels. This finding is similar to that reported in a study of overweight and obese individuals in Romania which showed that participants were usually not aware of their sub-optimal health.[34] Like many Arab countries, Oman has witnessed an alarming rise in its obesity rate in the last three decades, largely due to increased industrialisation, urbanisation, Westernisation, adoption of a sedentary lifestyle and improved socio-economic status.[35] Unfortunately, many obese individuals do not understand the necessity of making lifestyle changes due to a lack of knowledge about the cardiovascular implications of obesity.[36] This supports the need for educational interventions to increase awareness of CHD-associated risk factors and required lifestyle changes related to eating habits and physical activity.[37] Critically, a sizable number of participants in the present study believed that only physical activity performed at a gym or in an exercise class could prevent CHD. Female participants in a similar

study from India were aware that engaging in physical activity and losing weight were important lifestyle changes required for preventing CHD.[38] A study from the USA found that college-level students who exercised regularly rated their CHD risk as lower than those who did not;[32] this may indicate that knowledge of CHD risk factors can influence behaviour.

Education level was also found to have a significant association with CHD knowledge in the current study. This finding is consistent with results reported by Wagner *et al*. and highlights the need for multilateral interventions in order to enhance CHD awareness.[22] Many of these interventions could be based in the health sector; however, others are needed at the societal level in order to increase the level of general education among the community.[39] In the current study, married participants also had significantly less knowledge about CHD compared to their single counterparts. Similar results were found in a study conducted in Egypt.[40] Specific marital-related factors, such as family obligations, have been found to result in a lack of time to engage in preventative actions and may therefore contribute to a lack of knowledge about CHD.[7] In contrast, no significant association between CHD knowledge and gender was noted among the present cohort. This result was inconsistent with previous research by Jensen *et al*. which indicated that women were more aware of CHD risk factors than their male counterparts.[41] Sampling bias and the larger proportion of male participants in the current study could explain this inconsistency.

The results of this study should be considered by health policy-makers when designing and implementing interventions to enhance awareness and prevention of CHD in Oman, including mass media and other community awareness campaigns. These findings could also be used to identify individuals who are likely to possess lower knowledge levels so that they can be targeted with tailored education strategies. However, further studies using larger samples and a longitudinal design are needed to validate the findings of this study. The knowledge gaps identified in this study need to be explored in greater depth by healthcare service providers and researchers to determine psycho-cognitive factors affecting lifestyle behaviours. Culturally and ethnically diverse groups and rural communities have been a common focus for studies identifying CHD risk factors.[42,43] While ethnicity was beyond the scope of the current study, this factor may potentially be explored in later studies which include both the local and expatriate populations of Oman.

The current study had a number of limitations which may have impacted its findings. The cross-sectional nature of the study hindered the ability to draw inferences or generalise the findings to the larger Omani population. The use of a small convenience sample with a larger proportion of male participants, the self-selection of the group and the use of self-reported data may also have introduced inherent biases. Furthermore, the participants for the current study were attending a health awareness fair, indicating some degree of interest in health-related topics. It should also be noted that the original HDFQ questionnaire was created for diabetic patients with high health awareness, rather than to assess the general public on knowledge of CHD risk factors. As a result, the findings of this study may over- or underestimate knowledge of CHD risk factors in Oman.

Conclusion

Low levels of knowledge regarding CHD risk factors were reported among the studied group of Omani adults. While knowledge of certain CHD risk factors was adequate, fewer participants were aware of other risk factors, such as diabetes, stress, a family history of CHD, abdominal obesity, HDL and LDL. Marital status, BMI and education levels were significantly associated with knowledge levels. Health policy-makers should therefore consider these findings when preparing education programmes to enhance awareness of risk factors and prevention of CHD in Oman. Further studies are needed to determine the causative factors behind the identified knowledge gaps. In addition, studies using larger sample sizes and a longitudinal design are necessary to substantiate the results of this pilot study.

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CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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