



# DETERMINING THE HEALTH BELIEFS OF ADULTS REGARDING COLORECTAL CANCER SCREENING: A CROSSECTIONAL RESEARCH

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**Abstract – Objective:** Although colorectal cancers are the third type of cancer frequently seen in the world, participation in screening programs is not at the desired level. This study aimed to determine the health beliefs of individuals in regard to colorectal cancer prevention.

**Materials and Methods:** The sample of this cross-sectional study consisted of 506 adult individuals registered in primary healthcare centers in Izmir. Data was collected through face-to-face interviews between April 2018 and April 2019 using a Socio-demographic Information Form and a Health Belief Model Scale for Colorectal Cancer Screening. Descriptive statistics, t-test, and regression analysis using the SPSS 20 statistical software package were employed to analyze the data.

**Results:** The mean age of the participants was  $59.42 \pm 7.47$ , 64.2% were female, 58.5% were found to have a chronic disease. On the other hand, 58.1% stated they knew about screening tests, while 65.6% said they had never undergone any screening tests previously. Variables such as having a chronic disease, possessing knowledge about screening tests, exercising, the perception of confidence/benefits, and the perception of barriers were found to have a significant effect on individuals in terms of undergoing a fecal occult blood test.

**Conclusions:** The majority of participants were found to not participate in colorectal cancer screening behaviors. Gender, smoking and exercising were found to have an effect on individuals' beliefs regarding colorectal cancer prevention. It is recommended that future studies be carried out to enhance individuals' knowledge levels and enhance their perceptions of the utility of such screening.

**KEYWORDS:** Colorectal neoplasms, Early detection of cancer, Adult, Public health.

## INTRODUCTION

Colorectal cancer (CRC), which is the third leading cause of death in the world, ranks second in cancer-related deaths<sup>1</sup>. It also ranks third among the most prevalent cancers in both women and men in the United States (US), European countries, and Turkey<sup>2-4</sup>. The global burden of CRC is expected to increase by 60% and reaches more than 2.2 million new cases and 1.1 million deaths by 2030<sup>5</sup>. Age,

genetics, family history, and environmental risk factors all play a role in the etiology of CRCs. Environmental risk factors include high-fat and low-fiber diets, obesity, physical inactivity, smoking, and alcohol use<sup>2</sup>.

Incidence and mortality rates decrease with screening programs, and precancerous polyps causing CRC can be diagnosed at an early stage<sup>6</sup>. While CRC screening programs are administered to individuals over the age of 50 in Eu-



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European countries and the USA, they are carried out as a national-level, community-based service in Turkey that include a fecal occult blood test (FOBT) conducted once every two years and a colonoscopy conducted once every ten years for individuals between the ages of 50 and 70<sup>7</sup>. Individuals between the ages of 50-70 who are registered in Family Health Centers (FHC) are subjected to FOBT test every 2 years. This service is provided free of charge to individuals who are invited to the FHC for screening. In 2016, nearly one million individuals were screened for colorectal cancer in our country<sup>3</sup>. For CRC patients diagnosed at an early stage, the five year survival rate is 90%, but CRC is only be diagnosed at an early stage for 39% of patients<sup>2</sup>. According to the Centers for Disease Control and Prevention (CDC), the rate of individuals aged 50-75 who were screened for CRC in the USA increased from 67.4% in 2016 to 68.8% in 2018. However, CDC report 81% of individuals between the ages of 50 and 64 to not ever have had CRC screening yet<sup>8</sup>. Some studies conducted in our country report that knowledge levels of individuals 50 years and older regarding the screening and participation rates of screening programs are low (20.5%; 13.8%; 9.5%)<sup>9-11</sup>.

The Health Belief Model (HBM) is used to explain health behaviors for cancer prevention. A lack of information/awareness/advice of health professionals, a fear of being diagnosed with cancer, difficulty in transportation, and financial barriers have all been cited as problems by studies investigating barriers individuals can face when participating in screening programs<sup>12,13</sup>. Besides, previous studies show that awareness and health beliefs play an important role in participation in CRC screening programs<sup>12,14</sup>. This study aimed to determine the health beliefs of healthy adult individuals concerning participation in CRC screening programs.

## MATERIALS AND METHODS

### Research Questions

1. What is the participation rate of individuals in CRC screening?
2. Is there a difference in the health beliefs of individuals based on their socio-demographic characteristics?
3. Do the socio-demographic characteristics of individuals affect their CRC screening behaviors?
4. Do the health beliefs of individuals affect their CRC screening behaviors?

## METHODS

### Design, setting, and sample of the study

This cross-sectional study was carried out with individuals registered at 11 Family Health Centers (FHC) of the Provincial Health Directorate in the central county of Izmir province, the third-largest city in Turkey, between April 2018 and April 2019. The study population consisted of healthy individuals over 50 years of age living in Izmir. Since the number of individuals over the age of 50 who might visit FHCs within one month could not be predicted, the sample size was estimated using the sampling unknown universe method; accordingly, the sample size was determined to be at least 323 individuals considering a 0.05 standard error, 0.05 sampling error, and a 0.3 ratio of observations. The study included individuals who were over the age of 50, had no physical or mental disabilities, were literate and agreed to participate in the study. Individuals whose age range is not 50-70, having difficulty in communicating and illiterate were excluded from the study. On the other hand, individuals who quit the study of their own freewill or returned incomplete data forms were excluded from the study. After explaining the purpose of the study to each individual who came to FHC and complied with the criteria, forms were applied to the individuals who agreed to participate in the study. During the study, 630 individuals were interviewed. 120 of the individuals refused to participate in the study and 4 people were excluded from the study due to missing forms. Finally, the study was completed with 506 participants.

### Data collection procedures and tools

Data was collected via face-to-face interviews using a socio-demographic information form and the Health Belief Model Scale for Colorectal Cancer Screening. Each interview lasted an average of 20-25 minutes. While collecting data from the participants, an environment where their attention would not be distracted and their views were not interfered was created and the data were collected in a separate room. Before collecting the data, the participants were given detailed information about the research and the information about the context of the study was added to the top of the first page of the data collection form.

### SOCIO-DEMOGRAPHIC INFORMATION FORM

This form, consisting of 19 items regarding the descriptive characteristics of the individuals (e.g., age, gender, educational background, lifestyle habits, etc.), was developed by the researchers.

## HEALTH BELIEF MODEL SCALE FOR COLORECTAL CANCER SCREENING

This scale consists of 33 items. It was developed by Jacobs to measure individuals' susceptibility to CRC, their knowledge of the causes of the disease, actions that could be taken for its prevention, and their perception of the importance of the disease. A validity and reliability study of the Turkish version of the scale was conducted by Ozsoy et al<sup>15</sup>. The scale uses a 5-point Likert-type response format, and the subscales (perceived confidence-benefit, perceived severity, perceived barriers, perceived health motivation, and perceived susceptibility) are evaluated independently of each other; thus, there is no total score. Perceived susceptibility, defined as how vulnerable the person believes himself or herself to be to a given threat; perceived severity, defined as the person's interpretation of the degree of intensity of a disease, that is, the extent to which the person feels that the disease may make great demands on her or him or affect an individual's interpretation of obstacles preventing or controlling advance, access, or progress; perceived benefits, that is, a person's opinion of the effectiveness of some advised action to reduce the risk or seriousness of the impact; perceived barriers, a person's opinion of the concrete and psychological costs of this advised action; health motivation refers to a generalized state of intent that results in behaviors to maintain or improve health<sup>15</sup>. The response options for each item include: "5-Totally Agree; 4-Agree; 3-Slightly Agree; 2-Disagree; 1-Strongly Disagree". There is no inverse scoring for this scale, and Cronbach's alpha coefficients for the subscales were calculated as 0.54 and 0.88 by Ozsoy et al<sup>15</sup>. In the present study, Cronbach's alpha coefficients for the scale were found to be between 0.46 and 0.96.

### Statistical Analysis

The following tests were used to analyze the data; descriptive statistics such as number, percentage, *t*-testing and comparison of beliefs in participation in screening behavior according to socio-demographic data. Regression analysis to understand the impact of sociodemographic features on screening behavior. In the data analysis, the bias that may occur was removed by obtaining the opinions of a statistician other than the researchers.

### Ethical considerations

Written permission was obtained from the Izmir Provincial Health Directorate (issue no: 77597247-604.02). Ethics Committee Approval was obtained from the Dokuz Eylul University Non-Intervention-

al Research Ethics Committee (issue no: 070 and date 12.04.2018). Also, each individual participating in the study was informed about aim of research via verbal and written explanations.

## RESULTS

The mean age of the participants was  $59.42 \pm 7.47$ , 64.2% were female, 58.5% of the participants had a chronic disease, and 85.6% had no family history of colorectal cancer. Also, 70.4% of the participants reported they did not smoke, 85.6% did not use alcohol, and 71.5% did not exercise. On the other hand, 58.1% of the participants stated they knew CRC screening tests, and 42.1% said they learned about it from the FHC; however, 65.6% declared they had never had any screening tests done before. Of the participants who had previously undergone a screening test, 26.7% said they had a colonoscopy and 12.8% reported they had a FOBT (Table 1).

The subscale mean scores of the scale in this study were found as follows. The mean score obtained for the perception of the confidence/benefit subscale was  $25.33 \pm 13.12$  (min.-max:11.00-55.00). It was  $20.80 \pm 5.99$  (min.-max:6.00-30.00) for the perception of susceptibility subscale,  $19.00 \pm 4.95$  (min.-max:6.00-30.00) for the perception of barriers subscale,  $13.81 \pm 3.66$  (min.-max:5.00-25.00; low score means higher perception of barrier) for the perception of health motivation subscale, and  $13.91 \pm 4.11$  (min.-max:5.00-25.00) for the perception of severity subscale.

The mean scores of the male participants, obtained from the perceived susceptibility subscale, were significantly higher than those of the female participants ( $p < .05$ ). The mean scores of the participants who did not smoke, obtained from the perceived benefit subscale, were found to be significantly higher than of those who smoked. Also, the mean scores of the participants who did not exercise, obtained from the perceived health motivation subscale, were found to be significantly higher than the mean scores of those who exercised regularly. The mean scores of the participants who were not familiar with screening tests, obtained from the perceived benefit and health motivation subscales, were found to be significantly higher than of those who were familiar with the tests, whereas the mean scores for the perceived barriers and susceptibility subscales were significantly lower. On the other hand, the mean scores of the participants who had previously undergone screening tests, obtained from the perceived benefit subscale, were found to be statistically significantly lower than the scores of those who had not undergone any screening tests before ( $p < .05$ ), while the mean scores obtained from the perceived barriers subscale were found to be statistically significantly higher.



**TABLE 1.** Distribution of the Descriptive Characteristics of the Participants (n = 506).

<b>Features</b>	<b>(n=506)</b>	<b>%</b>
<b>Age (Mean ±SD)</b>	59.42 ± 7.47	
<b>Mass Body Index (Mean ±SD)</b>	27.00±4.44	
Smoking (pieces / day) (Mean ± SD)	6.22±8.97	
Alcohol use (times / week) (Mean ± SD)	0.53±1.20	
Exercise (times / week) (Mean ± SD)	1.64±2.42	
Number of meals per day (Mean ± SD)	3.01±.084	
<b>Gender</b>		
Woman	325	64.2
Male	181	35.8
<b>Marital status</b>		
Married	417	82.4
Single	89	17.6
<b>Education</b>		
Literate	50	9.9
Primary education	246	48.6
High school	115	22.7
College / University	95	18.8
<b>Chronic disease</b>		
Yes*	296	58.5
No	210	41.5
<b>Presence of CRK in Family History</b>		
Yes	73	14.4
No	433	85.6
<b>Smoking</b>		
Yes	150	29.6
No	356	70.4
<b>Alcohol</b>		
Yes	73	14.4
No	433	85.6
<b>Do you exercise regularly?</b>		
Yes	144	28.5
No	362	71.5
<b>Do you know about CRK screening tests?</b>		
Yes	294	58.1
No	212	41.9
<b>CRK test information source</b>		
Media	26	5.1
Family health center	213	42.1
Family / neighbors	35	6.9
Other	20	4.0
<b>Have you had a screening test before?</b>		
Yes	174	34.4
Woman	119	36.6
Male	55	30.3
No	332	65.6
<b>Which screening tests have you taken before? **</b>		
Fecal occult blood test (FOBT)	135	26.7
Colonoscopy	65	12.8

\*Hypertension, Diabetes, Heart Disease, Respiratory Disease, GIS Disease, Cancer, Hyperlipidemia, Parkinson's, Prostate.

\*\* Both answers can be marked. Percentages of those who answered yes were taken.

The mean score of the participants who had undergone a FOBT test before, obtained from the perceived barriers subscale, was determined to be significantly higher than the score of those who had not had this test conducted before. The mean score of

the participants who had undergone a colonoscopy test before, obtained from the perceived benefit subscale, was found to be significantly lower than the score of the participants who had not undergone the test before ( $p < .05$ ) (Table 2).

**TABLE 2.** Comparison of participants' Health Beliefs in Colorectal Cancer Screening according to their Descriptive Characteristics (N = 506).

Descriptive Features	n	Perceived Benefit			Perceived Susceptibility			Perceived Barriers			Perceived Health Motivation			Perceived Severity		
		mean±SS	t	p*	mean±SS	t	p	mean±SS	t	p	mean±SS	t	p	mean±SS	t	p
<b>Gender</b>																
Woman	325	24.62±12.85	-1.64	.10	20.86±5.75	.28	.77	18.90±5.00	-.59	.55	13.73±3.63	-.61	.53	13.44±4.10	-3.48	.00
Man	181	26.61±13.53			20.70±6.40			19.18±4.87			13.94±3.73			14.75±4.01		
<b>Smoking</b>																
Yes	150	23.35±11.60	-2.21	.02	21.61±5.89	1.96	.05	19.50±4.87	1.47	.14	13.75±3.37	-.22	.82	13.80±3.89	-.37	.70
No	356	26.17±13.64			20.46±6.00			18.79±4.98			13.83±3.78			13.95±4.21		
<b>Doing Exercise</b>																
Yes	144	25.27±15.01	.31	.75	20.40±6.45	-1.22	.22	19.51±5.55	1.42	.15	12.50±4.37	-4.96	.00	14.25±4.38	1.30	.19
No	362	24.87±11.97			21.12±5.73			18.81±4.69			14.24±3.15			13.72±4.01		
<b>Knowledge of Screening Tests</b>																
Yes																
No	294	22.82±12.30	-5.19	.00	21.43±5.60	2.80	.00	19.57±5.07	3.08	.00	13.30±3.61	-3.66	.00	13.87±4.09	-.27	.78
	212	28.82±13.39			19.93±6.39			18.21±4.69			14.50±3.62			13.97±4.15		
<b>Having previously done a scan</b>																
Yes																
No	174	23.73±13.54	-1.97	.04	21.34±5.84	1.44	.15	20.08±5.47	3.52	.00	13.35±3.53	-2.01	.04	13.99±4.15	.31	.75
	332	26.15±12.84			20.53±6.05			18.45±4.58			14.04±3.71			13.87±4.10		
<b>Having previously done FOBT</b>																
Yes																
No	135	24.46±13.72	-.90	.36	21.36±5.76	1.25	.20	20.22±5.33	3.38	.00	13.53±3.58	-1.02	.30	14.00±3.95	.28	.77
	371	25.65±12.90			20.60±6.06			18.56±4.74			13.91±3.69			13.88±4.17		
<b>Having previously done colonoscopy</b>																
Yes	65	21.81±12.98	-2.34	.02	21.07±6.13	.38	.69	19.64±6.01	1.11	.26	13.03±3.53	-1.84	.06	13.78±4.56	-.26	.78
No	441	25.85±13.07			20.76±5.97			18.91±4.78			13.92±3.67			13.93±4.05		

\*p-value significance level was taken as  $p < .05$ .





The proportion of participants who had undergone an FOBT test and also had a chronic disease was approximately 1.8 times higher than those who did not have a chronic disease. This proportion was 18.5 times higher in individuals who were familiar with the screening, while it was 0.6 times higher in individuals who exercised regularly compared to those who did not exercise at all. While the perceived benefit and perceived barriers were found to be significant for having undergone an FOBT test ( $p < .05$ ), the gender variable did not have any effect on it ( $p > .05$ ). The rate of those who had undergone a colonoscopy was approximately 2.5 times higher in individuals with chronic diseases. This rate was 3.1 times higher in participants who were familiar with screening tests, while the rate of those having had a colonoscopy test with a family history of CRC was 3.1 times higher. Moreover, the rate of those having had a colonoscopy test and exercised regularly was 2.1 times higher. The gender variable had no effect on participants' having had a colonoscopy test ( $p > .05$ ) (Table 3).

**DISCUSSION**

The external interpretation of the data with the literature information and the internal interpretation were made in line with the research questions. Of the individuals participating in the present study, 58.1% were determined to be familiar with CRC screening programs. On the other hand, the rate of those familiar with the screening tests was found to be 12.1% and, in other studies, 56.2%<sup>8,16</sup>. In a

study on women, women's knowledge of CRC and screening behaviors was not at the aimed level<sup>10</sup>. In a study by Hoffman et al [16], half of the respondents answered questions about CRC screening programs correctly. Juon et al<sup>17</sup> emphasized that individuals' lack of knowledge about CRC screening created barriers to their participation in it. Also, 42% of the participants stated they heard about CRC screening programs from FHCs. Similar to our findings, a study in the Czech Republic determined that individuals receiving information about CRC screening programs from general practitioners were eight times more likely to participate in screening programs<sup>18</sup>.

In this study, 26.2% of the participants were found to have an FOBT, and 12.8% had undergone a colonoscopy. Studies on this topic found different rates; for example, the rate of participation in any CRC screening was only 11.9%, while the rates of having had an FOBT and colonoscopy tests were 7.7% and 5.4%, respectively<sup>19</sup>. In a study conducted in the United States, 22.7% of the participants were found to have undergone CRC screening<sup>20</sup>. In a cross-sectional study conducted in the USA, the rate of respondents who answered "yes" to the question "CRC screening is not necessary if there are no symptoms" was 59.6%. In studies investigating participation rates in screening programs, the rates were found to not be at the desired levels, for which our findings were in agreement.

According to the HBM, individuals' perceptions of a disease determine their tendency to have had disease-specific screening tests. Studies investigating individuals' health beliefs have found that an es-

**TABLE 3.** Logistic Regression Analysis of the Variables Affecting Individuals' Participation in Screenings\* (n = 506).

<i>Fecal Occult Blood Test **</i>	<i>B</i>	<i>p</i>	<i>OO***</i>	<i>CI %95</i>	<i>Nagelkerke R<sup>2</sup></i>
Chronic Disease	.582	.018	1.790	1.103-2.905	.337
Knowledge of Screening Tests	2.923	.000	18.597	8.808-39.263	
Perceived Benefit	-.041	.011	.960	.930-.991	
Perceived Benefit	-.077	.006	.926	.876-.979	
Gender	.329	.127	1.39	.911-2.120	
Exercise	-.520	.018	.594	.386-.914	
<b><i>Colonoscopy****</i></b>					
Chronic Disease	.906	.006	2.475	1.144-4.142	.198
CRC- Family History	1.144	.001	3.139	1.618-6.089	
Knowledge of Screening Tests	1.137	.002	3.117	1.496-6.494	
Exercise	.778	.018	2.177	1.144-4.142	
Gender	.258	.368	1.294	.738-2.268	

\*Logistic regression analysis was performed with all variables that might affect the individual's ability to perform screening tests; All data are not transferred to the table.

\*\*FOBT status; '0' encoded as not scanned; '1' encoded as scanned.

\*\*\*OO: Odds Ratio

\*\*\*\*Status of colonoscopy; 0' encoded as not scanned; '1' encoded as scanned.

pecially low perception of barriers and high perception of severity were associated with participation in screening programs<sup>14,15,17</sup>. A comparison of our study results to those of other studies conducted in our country indicated that the scores of our participants regarding their perceptions of severity were lower, but their scores for the perception of barriers were higher<sup>21</sup>. Based on this finding, it can be concluded that the individuals in our study did not yet perceive colorectal cancer as a threat and that their perception of severity was not at an adequate level to motivate their having a screening test.

Although the CRC severity perceptions of the female participants in our study were lower than those of the men and the women were observed to participate in screening behaviors more frequently. In support of our findings, women were found to have had FOBT tests 5.2 times more than their male counterparts<sup>7</sup>. Unlike our results, there have been studies in the literature reporting that women participate in colorectal cancer screening less often<sup>19,22</sup>. This difference can be explained by the fact that our country is a patriarchal society due to its culture and that women reach health services more difficult. In addition, the fact that the number of women in our study is twice as compared to men may have affected this result.

According to the HBM, individuals with a high perception of confidence/benefit are expected to make positive health-related behavioral changes<sup>17</sup>. In our study, the non-smoking participants had a higher perceived benefit. When compared to a study conducted in our country, the confidence/benefit score of our participants was found to be higher<sup>21</sup>. According to the results of this study, the perception of benefit was effective in developing healthy lifestyle behaviors. Findings from a study by Caman et al<sup>23</sup>, which found smoking quit rates of 40.7% in individuals with a family history of CRC, also supported the results of our study.

Regular exercise is a factor that reduces the risk of CRC. In our study, participants who did not exercise regularly had a higher health motivation perception of colorectal cancer than those who did exercise. Also, approximately half of our participants were observed to know nothing about CRC screening tests. In another study, only one quarter of the participants were determined to possess knowledge about CRC<sup>19</sup>. In a study conducted in our country, the question of whether regular exercise protects you from cancer is asked. 24% of the respondents replied that I have no idea [10]. The reason for this difference in our results; suggests that participants may not be aware of the relationship between exercise and CRC. In addition, the fact that only 28% of our participants exercise regularly may have affected the result in this direction.

In this study, individuals who had a previous colonoscopy had lower perception of benefit than individuals not having colonoscopy. In the study that investigated the reasons of individuals not having a colonoscopy, it was found that individuals felt anxiety and fear towards colonoscopy<sup>24</sup>. In our study, individuals had colonoscopy but could not fully understand the benefit of colonoscopy; on the contrary, it is seen that individuals who do not believe in the benefit of colonoscopy but do not have a colonoscopy. In parallel with the literature, we can think that the feeling of fear in individuals is effective in our findings.

The mean score of participants who had undergone a FOBT test previously, obtained from the perceived barriers subscale, was significantly lower than that of those who had not had an FOBT test previously. In studies investigating barriers faced by individuals in CRC screening programs, individuals expressed barriers like access difficulties and financial problems<sup>19,25,26</sup>. However, the fact that screening programs are included in national-level screening programs in Turkey and that they are free of charge, as in most countries, suggests a reduction of individuals' perceived barriers.

In this study, the FOBT test was performed and the rate of those who knew about screening tests was 18.5 times higher than those who did not know about the tests, while the perceived benefits and perceived obstacles of those who did not have FOBT tests were found approximately one-fold. Unlike our findings, Oztas et al<sup>14</sup> found that familiarity with screening tests had a significant effect on having undergone a FOBT test, but that the perceived benefit and perceived barriers did not have a significant impact on having undergone a FOBT test. It was concluded that those who had previously taken FOBT test had high perception of both benefit and barriers, but these perceptions negatively affected their participation in screening tests. This is a contradiction and it may be thought that it is due to the lack of cues to action factors and the of preparedness of individuals to have screening tests.

In this study, the proportion of those having undergone a colonoscopy test was 3.1 times higher in individuals with a family history of CRC. Similar to our results, in a study conducted with agricultural workers from our country, the proportion of those having undergone a screening test was 10 times higher in individuals with a history of CRC among their family or friends<sup>27</sup>. Also, Kroupa et al<sup>20</sup>, found that participation in screening behaviors in individuals with a family history of CRC was four times greater. In the same study, the gender variable was found to be significant in terms of participating in CRC screening programs, and women were observed to participate in screening programs approximately twice as often as men. However, in our findings, there was no



significant effect of the gender variable on screening programs. Contrary to our findings, a history of CRC in family members was not found to be decisive in individuals' participation in CRC screening tests<sup>6</sup>.

## Limitations

Since these results belong only to this sample group, the inability to generalize the results constitutes the limitation of the study.

## CONCLUSIONS

To increase participation in screening program is one of the priority strategies in Turkey as well as all over the world. These results showed that, to increase the participation of individuals in CRC screenings, it is first necessary to increase their level of knowledge of and the perceived benefits related to the screening. Perceived barriers were observed to affect participation in the screening tests. Thus, these barriers should be revealed, and related interventional studies should be planned, especially concerning CRC risk factors. It is expected that it will guide the strategies to be developed on how to increase participation in screening programs in line with individuals' beliefs.

## FUNDING

Research expenses were covered by the researchers and no financial support was received from any institution.

## CONFLICT OF INTEREST:

The authors have not reported any conflict of interest between them.

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