Original Article

The association of eating behaviors with blood pressure levels in college students: a cross-sectional study

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Backgrounds: The present study aimed to investigate the relationship between eating habits and blood pressure levels in college students in order to provide more insights into the prevention and control of hypertension.

Methods: A self-administered questionnaire was distributed to first-year college students. The demographic characteristics, eating behaviors, smoking and drinking status, and physical activity of 3,324 eligible respondents were analyzed. Multivariate logistics regression model was used to analyze the association of eating behaviors with blood pressure levels.

Results: The study participants had a mean (SD) age of 18.51 (1.00) years. The mean systolic blood pressure (SBP) and diastolic blood pressure (DBP) levels were 114.08 and 70.92 mmHg, respectively. The overall prevalence of hypertension was 7.2%; and the prevalence among males and females was 12.9% and 3.2%, respectively. Multivariate logistic regression results confirmed that students' taste preference, desserts, and late-night snacks were associated with hypertension. Students who ate spicy food had a lower risk of high blood pressure (OR =0.642, P=0.028); as was having dessert 3–6 times a week (OR =0.702, P=0.037), while those who ate late-night snacks on 6–7 days of the week had a higher risk for hypertension (OR =2.093, P=0.013).

Conclusions: More targeted interventions should be taken to improve students' eating habits and control their blood pressure.

Keywords: Eating behaviors; eating habits; blood pressure; hypertension

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Introduction

Hypertension is considered to be a risk factor for complications such as stroke, coronary heart disease, and other cardiovascular events (1). By 2025, an estimated 1.56 billion people will be affected by hypertension globally (2). The Global Burden of Disease has reported that high systolic blood pressure (SBP) is expected to remain as the single biggest contributor to the global disease burden, with this burden expanding as the population ages (3). An unhealthy lifestyle and genetic factors are considered to be the main contributors to elevated blood pressure. Adopting a reasonable lifestyle is the most economical and effective way to prevent and control hypertension. Indeed, guidelines from the United States (4), China (5), and Europe (6) include recommendations on diet and lifestyle, advocating

reduced dietary salt intake and increased intake of fresh fruit and vegetables. However, even the relationship between salt intake and cardiovascular disease is controversial (7).

In adolescents, short-term elevated blood pressure heightens the risk of developing hypertension as an adult. Tirosh *et al.* found that the incidence of hypertension among adults who had a baseline blood pressure of 130–139/85–89 mmHg as an adolescent was 14.53% for men and 4.94% for women, which represented a 3-fold increase in the incidence rate compared to that of peers (8). Non-pharmacological interventions, including the adoption of healthy dietary habits, are considered important for the prevention of hypertension in adolescents. Recently, a number of studies have been conducted to evaluate the relationship between eating habits and blood pressure (9-11). The CARDIA study reported that eating breakfast daily was associated with a hazard ratios (HR) for hypertension of 0.84 (95% CI, 0.72–0.99) in young adults (12). Meanwhile, a longitudinal study of 8153 middle-aged adults found that while night-time eating habits were not associated with a higher risk of hypertension, the risk of obesity was increased (13). However, studies on eating habits and blood pressure levels in Chinese adolescents and young adults are lacking.

Therefore, this study aimed to assess the relationship between eating habits and blood pressure levels in college students in order to provide more insights into the prevention and control of hypertension. We present the following article in accordance with the STROBE reporting checklist (available at http://dx.doi.org/10.21037/atm-20-8031).

Methods

Participants and study design

The present study used a cross-sectional study design and was conducted between September and November, 2018. A total of 3,450 first-year students at a medical college were invited to participate; the response rate was 99.42% (3,430 students). A preliminary investigation was conducted before the survey and the questionnaire was modified and improved. The formal investigation was carried out by investigators with unified training. Before the investigation began, all respondents signed the informed consent form; at the same time, the investigators gave the corresponding guidance. The questionnaires were collected on the spot after completion, and checked in time. The questionnaire included questions on the students' demographic characteristics, eating behaviors, smoking and drinking status, and physical activity. For the analysis, blood pressure measurements also needed to be taken. Finally, 106 subjects for whom blood pressure measurements or eating variables were missing were excluded, and the remaining 3,324 eligible subjects were included in the final analysis.

The study procedures were approved by the Scientific Research Institutional Review Board of Yijishan Hospital of Wannan Medical College (No. 2018-32), and written informed consent was obtained from all the participants. All procedures performed in this study involving human participants were in accordance with the Declaration of Helsinki (as revised in 2013).

Eating habits questionnaire design

The questions included in the eating habits questionnaire are shown below, along with the possible answers in brackets.

1. How would you describe your taste preference? (Salty/bland/sweet/spicy)
2. Do you regularly eat 3 meals a day? (Yes/no)
3. How many days have you skipped breakfast in the past week? (≤2 days/3–5 days/6–7 days)
4. How many types of vegetables do you eat every day? (≤2 types/3–5 types/>5 types)
5. How would you describe your daily diet? (Mostly meat/mostly vegetables/balanced between meat and vegetables)
6. How many times have you eaten fresh fruit in the past week? (≤2 times /3–6 times/once a day/≥2 times a day)
7. How many times have you had carbonated drinks (e.g., lemonade or cola) in the past week? (≤2 times/3–6 times/once a day/≥2 times a day)
8. How many times have you had snacks (e.g., sweets, chocolate, or pastry) in the past week? (≤2 times/3–6 times/once a day/≥2 times a day)
9. How many times have you eaten food from a roadside stand in the past week? (≤2 times/3–6 times/once a day/≥2 times a day)
10. How many times have you had instant noodles in the past week? (≤2 times /3–6 times/once a day/≥2 times a day)
11. How many days have you eaten a meal in a Western fast food restaurant in the past week? (≤2 days/3–5 days/6–7 days)
12. How many days have you had at least 1 glass of milk or

Table 1 The characteristics and health behaviors of students (n=3,324)

Item	Mean ± SD or N (%)	N (%)	N (%)
Mean age (years)	18.51±1.00		
Mean SBP (mmHg)	114.08±13.68		
Mean DBP (mmHg)	70.92±10.56		
Hypertension, n (%)	Overall, 239 (7.2)	Male, 177 (12.9)	Female, 62 (3.2)
Regular exercise, n (%)	Yes, 928 (27.9)	No, 2,386 (71.8)	Unspecified, 10 (0.3)
Current smoking habit, n (%)	Yes, 40 (1.2)	No, 3,278 (98.6)	Unspecified, 6 (0.2)
Current drinking habit, n (%)	Yes, 26 (0.8)	No, 3,288 (98.9)	Unspecified, 10 (0.3)

SD, standard deviation; SBP, systolic blood pressure; DBP, diastolic blood pressure.

soy milk in the past week? (≤2 days/3–5 days/6–7 days)

13. How many days have you had late-night snacks in the past week? (≤2 days/3–5 days/6–7 days)
14. How many days have you eaten fried food in the past week? (≤2 days/3–5 days/6–7 days)

Physical examinations

Blood pressure was measured after the subjects had rested well for 5 minutes. The blood pressure of each subject was measured twice (with a 1-minute interval) in a seated position, using an automated electronic sphygmomanometer (Omron U30, Japan). Hypertension in individuals aged ≥16 years old was defined as SBP ≥140 mmHg and/or diastolic blood pressure (DBP) ≥90 mmHg (14). Physical activity was defined as exercise causing heavy sweating or a large increase in breathing or heart rate that lasted at least 30 minutes per day for ≥3 times a week (15). Current smoking status and current alcohol intake were defined by "yes" or "no".

Statistical analysis

Continuous data were presented as means ± standard deviation (SD) and compared using the *t*-test or one-way analysis of variance (ANVOA). Categorical variables were described as percentages and compared using the Chi-square test. The associations between eating habits and hypertension were assessed by performing logistic regression analyses to estimate odds ratios (OR) and their 95% confidence intervals (CI). Multiple logistic regression models were used to further correct for covariates, including age, sex, physical activity, current smoking status, and current alcohol intake.

Statistical analyses were performed using SPSS version 26.0 (SPSS, Inc., Chicago, IL, USA). Results with a 2-tailed P value of 0.05 were considered statistically significant.

Results

Characteristics of the subjects

The 3,324 eligible subjects (including 1,372 males) enrolled in this study had a mean (SD) age of 18.51 (1.00) years old. The mean SBP and DBP levels were 114.08 and 70.92 mmHg, respectively. The overall prevalence of hypertension was 7.2%; among males and females the prevalence was 12.9% and 3.2%, respectively. The majority of students (86.6%) ate 3 meals regularly every day, and 73.5% ate breakfast ≥6 times a week. Of the students, 27.9% exercised regularly. Few students had a habit of smoking (1.2%) or drinking (0.8%). See *Table 1*.

The difference in blood pressure levels among students with different eating habits

Students who preferred to eat spicy food or sweet food had significantly lower blood pressure than students who preferred to eat bland or salty food, while those who preferred salty food had higher blood pressure than those who liked bland food (P<0.001 in SBP; P=0.009 in DBP). The students whose diets consisted mainly of vegetables had lower blood pressure than those diets consisted mainly meat (P=0.007 in SBP; P=0.039 in DBP), but no difference was found in blood pressure in terms of the how many kinds of vegetables. Students who ate late-night snacks and drank carbonated drinks had significantly higher blood pressure than those who did not (all P<0.05). Students with

a habit of eating fruit and eating food from roadside stands had lower blood pressure levels (all P<0.05). The blood pressure of students who frequently ate dessert showed a slight U-shaped trend, and the lowest point was in the 1/day group (P<0.001 in SBP; P=0.002 in DBP). The detailed results are shown in *Table 2*.

The association of eating habits with hypertension

Univariate logistic regression found that taste preference, meal composition, fruit intake, carbonated drinks, dessert, eating food from roadside stands, and late-night snacks were associated with hypertension (*Table 3*). The results of multivariate logistic regression confirmed the association between students taste preferences, dessert, and late-night snacks. Eating spicy food was significantly associated with hypertension [OR =0.642, 95% CI: 0.433–0.954 (*vs.* bland food); P=0.028]. Having dessert 3–6 times a week was associated with hypertension [OR =0.702, 95% CI: 0.504–0.978 (*vs.* ≤2 times); P=0.037], as was eating late-night snacks 6–7 days per week [OR =2.093, 95% CI: 1.165–3.760 (*vs.* ≤2 days); P=0.013] (*Table 4*).

Discussion

Through physical examination and questionnaire survey of the 3,324 students, we found that the prevalence of hypertension in males (12.9%) was much higher than that in females (3.2%). It may be due to gender differences, the female's menstrual periods and estrogen have a certain protective effect on their blood pressure. Previous epidemiological studies have indicated that various dietary factors may affect the regulation of blood pressure. This study further showed that some eating habits can influence blood pressure.

In this study, we confirmed a clear relationship between salt intake and blood pressure levels. Compared with those students who preferred a bland diet, the mean SBP of students who preferred salty food was 1.7 mmHg higher. There is sufficient evidence that high sodium consumption is a risk factor for hypertension both in children and adults, and reducing sodium intake has been advocated globally (16-18). A pooled analysis of 4 large prospective studies indicated that increased sodium intake in individuals with hypertension resulted in a larger increase in SBP (2.08 mmHg change per g sodium increase) than that seen in normotensive individuals (1.22 mmHg change per g), while low sodium intake (<3 g/day) increased the risk of cardiovascular events and death, regardless of whether an individual was hypertensive or not (19). The results suggested that for people with normal blood pressure, strict control of salt intake may not have cardiovascular benefits. Although our study once again confirmed that salt consumption was associated with increased blood pressure, we did not carry out a quantitative assessment of sodium intake, which meant that the relationship between sodium intake levels and hypertension could not be analyzed further.

Interestingly, we also found that students with a preference for sweet food had lower blood pressure levels than those with bland diets. This finding was consistent with an observation made by another Chinese study that people with a 'sweet tooth' dietary pattern were less likely to have high blood pressure (20). However, inconsistent results have also been reported. In Payab *et al.*'s study of 14,880 Iranian children and adolescents (21), no association was observed between sweet consumption and hypertension. Further, Majane *et al.* demonstrated that a diet high in sugar and saturated fat resulted in hypertension in spontaneously hypertensive rats (22). Moreover, in this study, a U-shaped trend was found between dessert frequency and blood pressure levels. These results suggest that the consumption of suitable sweets has no adverse effect on blood pressure. The explanation for this phenomenon may be that sweets can make people feel good (23), and an inverse association between negative emotions and blood pressure has been reported (24).

Late-night snacks have been reported to be associated with cardiovascular disease (25), as well as diabetes (26). A previous study reported that for individuals who ate supper before going to bed, the risk of acute onset hypertension was 27% higher than that of individuals who did not (27). We found a positive association between the frequency of late-night snacking and blood pressure, as well as an increased risk of hypertension among students who regularly ate late at night. The mechanism underlying this may be related to the increase in other risk factors for hypertension, such as the increase in total cholesterol and low-density lipoprotein (LDL) cholesterol, as well as the reduction of fat oxidation, caused by snacking at night. This indicates that eating at night can change fat metabolism, thus increasing the risk of obesity (28,29).

Regarding the consumption of carbonated drinks, a type of sugar-sweetened beverage, significant differences were found between consumption frequency and hypertension. According to Chen *et al.*, a reduction in sugar-sweetened

Table 2 Differences in blood pressure levels of students with different eating habits (mean ± SD)

Question	Answer	N (%)	SBP (mmHg)	F/t	P value	DBP (mmHg)	F/t	P value
Taste	Bland	1,918 (57.7)	114.5±13.84			71.04±10.57		
	Salty	405 (12.2)	116.19±14.3			72.13±11.36		
	Sweet	214 (6.4)	112.68±13.47			71.04±10.27		
	Spicy	787 (23.7)	112.35±12.81	8.795	<0.001	69.99±10.1	3.896	0.009
Regular diet	Yes	2,879 (86.6)	114.48±13.89			71.8±10.79		
	No	445 (13.4)	114.02±13.65	0.424	0.515	70.77±10.51	1.881	0.060
Skipping breakfast	≤2 days	2,444 (73.5)	113.9±13.75			70.88±10.4		
	3–5 days	690 (20.8)	114.37±13.53			71.13±10.61		
	6–7 days	190 (5.7)	115.41±13.43	1.258	0.284	70.7±12.31	0.187	0.830
Vegetable intake	≤2 types	1,447 (43.5)	113.69±14			71±10.69		
	3–5 types	1,744 (52.5)	114.36±13.35			70.93±10.43		
	>5 types	133 (4.0)	114.8±14.58	1.135	0.321	69.96±10.77	0.593	0.553
Meal composition	Mainly meat	487 (14.7)	114.9±13.44			71.17±9.93		
	Mainly vegetables	753 (22.7)	112.75±13.29			70.06±10.51		
	Balanced	2,084 (62.7)	114.37±13.86	4.901	0.007	71.18±10.7	3.236	0.039
Fruit intake	≤2 times	904 (27.2)	116.18±13.99			71.78±11.11		
	3–6 times	1,561 (47.0)	113.25±13.39			70.42±10.37		
	1/day	653 (19.6)	113.93±13.63			71.11±10.18		
	≥2/day	206 (6.2)	111.68±13.66	11.220	<0.001	70.36±10.48	3.433	0.016
Carbonated drinks*	≤2 times	2,892 (87.0)	113.49±13.55			70.7±10.42		
	3–6 times	373 (11.2)	117.81±13.86			72.3±11.48		
	1/day	52 (1.6)	119.57±14.42			73.07±10.33		
	≥2/day	7 (0.2)		21.419	<0.001		4.997	0.007
Dessert	≤2 times	1,959 (58.9)	115.14±14.05			71.4±10.74		
	3–6 times	1,047 (31.5)	112.82±13.09			70.51±10.25		
	1/day	215 (6.5)	110.62±12.43			68.69±10.26		
	≥2/day	103 (3.1)	114.03±13.04	11.564	<0.001	70.73±10.07	5.092	0.002
Roadside stands*	≤2 times	2,810 (84.5)	114.49±13.77			71.09±10.58		
	3–6 times	485 (14.6)	112.03±13.05			69.97±10.42		
	1/day	27 (0.8)	109.07±11.87			70.52±10.04		
	≥2/day	2 (0.1)		8.678	<0.001		2.348	0.096
Instant noodles*	≤2 times	2,888 (86.9)	114.01±13.67			71.03±10.49		
	3–6 times	396 (11.9)	114.85±13.97			70.21±11.11		
	1/day	33 (1.0)	111.78±11.44			70.28±9.98		
	≥2/day	7 (0.2)		1.229	0.293		1.130	0.323

Table 2 (*continued*)

Table 2 (*continued*)

Question	Answer	N (%)	SBP (mmHg)	F	P value	DBP (mmHg)	F	P value
Western fast food	≤2 days	3,214 (96.7)	114.08±13.69			70.93±10.53		
	3–5 days	88 (2.6)	113.82±13.31			70.22±10.97		
	6–7 days	22 (0.7)	116.23±14.89	0.287	0.751	73.41±12.14	0.808	0.446
Milk or soy milk	≤2 days	1,117 (33.6)	114.21±13.63			71.27±10.97		
	3–5 days	1,381 (41.5)	114.03±13.87			70.66±10.34		
	6–7 days	826 (24.8)	114±13.46	0.073	0.929	70.88±10.35	1.044	0.352
Late-night snacks	≤2 days	2,543 (76.5)	113.77±13.21			70.82±10.36		
	3–5 days	649 (19.5)	114.75±14.69			71.28±11.25		
	6–7 days	132 (4.0)	116.82±16.89	4.076	0.017	71.14±10.84	0.510	0.600
Fried food	≤2 days	2,556 (76.9)	114.33±13.71			70.99±10.59		
	3–5 days	685 (20.6)	113.33±13.71			70.75±10.32		
	6–7 days	83 (2.5)	112.59±12.61	1.950	0.142	70.27±11.37	0.311	0.732

*, the ≥2/day group is too small and has been combined with the 1/day group. P, probability; SD, standard deviation; SBP, systolic blood pressure; DBP, diastolic blood pressure.

Table 3 Univariate logistic regression results of the association between eating habits and hypertension

Question	Answer	n	OR	95% CI	P value
Taste	Bland	1,918	Reference	–	–
	Salty	405	1.555	1.096–2.207	0.013
	Sweet	214	0.85	0.482–1.499	0.573
	Spicy	787	0.531	0.361–0.782	0.001
Regular diet	Yes	2,879	0.804	0.560–1.154	0.237
	No	445			
Skipping breakfast	≤2 days	2,444	Reference		
	3–5 days	690	1.409	0.846–2.346	0.188
	6–7 days	190	1.097	0.794–1.515	0.574
Vegetable intake	≤2 types	1,447	Reference		
	3–5 types	1,744	0.961	0.733–1.260	0.775
	>5 types	133	1.268	0.678–2.369	0.458
Meal composition	Balanced	487	Reference	–	–
	Mainly meat	753	0.691	0.458–1.044	0.079
	Mainly vegetables	2,084	0.669	0.472–0.949	0.024
Fruit intake	≤2 times	904	Reference		
	3–6 times	1,561	0.624	0.460–0.847	0.002

Table 3 (*continued*)

Table 3 (*continued*)

Question	Answer	n	OR	95% CI	P value
	1/day	653	0.662	0.451–0.973	0.036
	≥2/day	206	0.867	0.503–1.493	0.606
Carbonated drinks*	≤2 times	2,892	Reference		
	3–6 times	373	1.854	1.306–2.631	0.001
	1/day	52	1.641	0.696–3.870	0.257
	≥2/day	7			
Dessert	≤2 times	1,959	Reference		
	3–6 times	1,047	0.580	0.424–0.793	0.001
	1/day	215	0.352	0.163–0.759	0.008
	≥2/day	103	0.647	0.279–1.497	0.309
Roadside stands*	≤2 times	2,810	Reference		
	3–6 times	485	0.574	0.366–0.899	0.015
	1/day	27	0.894	0.211–3.785	0.879
	≥2/day	2			
Instant noodles*	≤2 times	2,888	Reference		
	3–6 times	396	1.100	0.743–1.630	0.635
	1/day	33	0.332	0.045–2.429	0.278
	≥2/day	7			
Western fast food	≤2 days	3,214	Reference		
	3–5 days	88	1.499	0.742–3.027	0.259
	6–7 days	22	2.078	0.610–7.073	0.242
Milk or soy milk	≤2 days	1,117	Reference		
	3–5 days	1,381	0.887	0.654–1.203	0.439
	6–7 days	826	0.951	0.675–1.341	0.774
Late-night snacks	≤ 2 days	2,543	Reference		
	3–5 days	649	1.344	0.980–1.842	0.067
	6–7 days	132	1.962	1.137–3.387	0.015
Fried food	≤2 days	2,556	Reference		
	3–5 days	685	0.755	0.531–1.073	0.117
	6–7 days	83	0.780	0.312–1.951	0.596

*, the ≥2/day group is too small and has been combined with the 1/day group. P, probability; OR, odds ratio; CI, confidence interval.

beverage consumption of 1 time per day in adults was associated with a 1.8-mmHg reduction in SBP and 1.1-mmHg reduction in DBP (30). However, in children and adolescents, another study found no significant association between sugar-sweetened beverages and hypertension (21). Research on the relationship between carbonated drinks and hypertension is sparse. However, with the increase in the consumption of carbonated drinks

Table 4 Multivariate logistic regression results of the association between eating habits and hypertension

Question	Answer	Adjusted**		
		OR	95% CI	P value
Taste	Bland	Reference		
	Salty	1.389	0.969–1.990	0.073
	Sweet	0.911	0.511–1.624	0.752
	Spicy	0.642	0.433–0.954	0.028
Meal composition	Balanced	Reference		
	Mainly meat	0.635	0.417–0.967	0.034
	Mainly vegetables	0.730	0.511–1.042	0.083
Fruit intake	≤2 times	Reference		
	3–6 times	0.866	0.626–1.198	0.384
	1/day	0.904	0.599–1.363	0.630
	≥2/day	1.329	0.729–2.425	0.354
Carbonated drinks*	≤2 times	Reference		
	3-6 times	1.215	0.833–1.770	0.312
	1/day	0.800	0.303–2.114	0.653
	≥2/day			
Dessert	≤2 times	Reference		
	3–6 times	0.702	0.504–0.978	0.037
	1/day	0.585	0.266–1.287	0.182
	≥2/day	0.979	0.408–2.345	0.961
Roadside stands*	≤2 times	Reference		
	3–6 times	0.689	0.428–1.109	0.125
	1/day	1.323	0.295–5.927	0.715
	≥2/day			
Late-night snacks	≤ 2 days	Reference		
	3–5 days	1.346	0.962–1.883	0.083
	6–7 days	2.093	1.165–3.760	0.013

*, the ≥2/day group is too small and has been combined it with the 1/day group; **, adjusted for age, sex, physical activity, current smoking status, and current alcohol intake. P, probability; OR, odds ratio; CI, confidence Interval.

among college students, research on this relationship is worthy of attention.

We also found that students who preferred a spicy diet had the lowest blood pressure levels among the 4 taste-preference groups, along with a lower risk of hypertension. Similar results were obtained in previous studies. He *et al.* found that a higher frequency of spicy food consumption was significantly associated with lower SBP and DBP, and lower risk of hypertension in women (31). According to a random-order, double-blind observational and interventional study, subjects with a strong preference for spicy food had a lower salt intake and lower blood pressure than subjects who had other taste preferences (32). However, in a recent study, a preference for spicy food

was found to be negatively correlated with diabetes risk, but not with hypertension (33). These results suggested that the application of spicy flavoring may be an actionable behavioral intervention for reducing high salt intake and blood pressure.

In our study, we observed a significant association between blood pressure and fruit intake; however, this association was no longer significant after adjusted the covariates in multivariate regression analysis.

This study has some limitations. Firstly, we replaced the specific food consumption with a food frequency questionnaire because of the all of the most students dine in the school cafeteria, the precise amount of food consumed was unknown, and the relationship between food consumption and blood pressure was not explored, that may affect the results of this study. Secondly, this study has a cross-sectional design; therefore, the causal relationship between eating habits and blood pressure could not be determined. Another limitation is that the canteen in which the students in this study eat mostly serves food typical of southern China, thus making it impossible extrapolate our results to other populations. Nevertheless, we believe that these limitations do not invalidate the results obtained.

In conclusion, frequent late-night snacking and desserts, and a preference for spicy food were associated with hypertension in college students. Moreover, a significant association existed between salt intake, carbonated drinks, fruits, and blood pressure levels. These results suggest that more effective interventions or changes in the eating habits of students are necessary.

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Footnote

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Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. The study procedures were approved by the Scientific Research Institutional Review Board of Yijishan Hospital of Wannan Medical College (No. 2018-32), and written informed consent was obtained from all the participants. All procedures performed in this study involving human participants were in accordance with the Declaration of Helsinki (as revised in 2013).

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