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Original Article

Relationship of Breakfast Habits with Hypertension and Obesity: A Cross-Sectional Study among Korean Adults and Older Adults

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Abstract

Background: We examined the association of breakfast habits with hypertension and obesity risk among Korean adults and older adults, focusing on sex-based and age-based differences.

Methods: We collected data from 2,779 adults (1,380 men and 1,399 women, aged 19–64 years) and 623 older adults (289 men and 334 women, aged ≥65 years) from the 2015 Korea National Physical Fitness Project, an extensive survey organized biennially by the Korea Ministry of Culture, Sports and Tourism and the Korea Institute of Sport Science.

Results: For women aged 19 to 64 yr, skipping breakfast was linked to an increased likelihood of developing both high blood pressure and obesity. For men aged 19–64 years, having breakfast irregularly or replacing it with snacks were linked to a reduced likelihood of hypertension, whereas skipping breakfast slightly elevated the risk. For older women aged above 65 years, irregular breakfast consumption or replacing it with snacks was linked to a heightened likelihood of developing hypertension. Nonetheless, there was no notable correlation identified between breakfast habits and obesity in men and older adults. In older men and women, consistent physical exercise proved to be an essential factor in mitigating the chance of hypertension.

Conclusion: These findings emphasize the importance of sex- and age-specific public health strategies, with implications for public health interventions and guidelines that promote regular breakfast consumption and physical activity.

Keywords: Adult; Body mass index; Breakfast; Hypertension; Obesity

Introduction

Hypertension and obesity are critical public health issues in South Korea. Findings reported by the 2022 Korea National Health and Nutrition Examination Survey indicate that over 26% of men and 17% of women aged 19 and older experience hypertension, underscoring its contribution to early mortality (1). Regarding obesity, 47.7% of men and 25.7% of women aged >19 were obese in 2022, and the prevalence of obesity is increasing every year in the country (1). Higher-than-optimal body mass index (BMI) was reported to be associated with approximately 5 million deaths, primarily owing to its role as a notable

risk for chronic illnesses, including cardiovascular conditions, diabetes, and some cancers (2).

The relationship between the habit of eating breakfast and metabolic disorders, such as hypertension and obesity, has been frequently highlighted (3,4). Recent studies have revealed the important role of breakfast consumption in various health outcomes, suggesting its crucial role in managing and potentially reducing the risk of hypertension and obesity (5,6). Several studies have examined the role of breakfast in shaping health outcomes among Koreans. For instance, Lee et al (7) found an association between regular breakfast consumption and reduced risk of hypertension in Korean adults. Irregular meal patterns and infrequent breakfast intake are associated with higher BMI and unfavorable lipid profiles among Korean adults (8). These results align with global studies indicating that skipping breakfast can worsen cardiovascular disease and increase the risk of obesity (3,4).

While prior studies have provided salient insights, research elucidating the nexus between breakfast habits and metabolic disorders among the Korean populace remains limited. Investigations at a national level in South Korea are relatively rare. Hence, our current study is distinguished by its focus on the differential effects of breakfast habits across various demographic groups, particularly regarding age and sex, in South Korea.

Consequently, this research sought to examine how breakfast consumption patterns relate to the likelihood of hypertension and obesity among Korean adults and older populations, with a focus on age- and sex-based differences and their health implications, by analyzing a sizable and diverse sample to validate prior findings and contribute to the existing literature.

Materials and Methods

Study population

Data for this research were sourced from the 2015 Korea National Physical Fitness 100 Project, which is conducted every two years by the Korea Sports Science Institute in partnership with the Korea Ministry of Culture, Sports and Tourism. The survey applied a stratified sampling technique based on gender, age, and geographic region to ensure national representation. We excluded the data of the respondents who did not respond to the questionnaire on breakfast consumption. Consequently, the final sample comprised 2,779 adults (aged 19–64 years) and 623 older adults (aged ≥65 years).

All research procedures complied with the ethical guidelines of the Declaration of Helsinki, and the study received approval from the Korea Institute of Sport Science and the Korea Ministry of Culture, Sports and Tourism. The nature of this secondary analysis eliminated the need for further ethical approval. Specifically, ethical approval was unnecessary as the raw data from the Korea National Physical Fitness Project excluded any personal identifying details, including names, phone numbers, addresses, and social security numbers.

Breakfast habits

Breakfast habits were assessed by asking participants, “Do you have breakfast regularly?” Response choices included “regular breakfast,” “irregular breakfast,” “skip breakfast every day,” or “replace with snacks.” “Irregular breakfast” refers to inconsistent eating patterns wherein participants did not have a regular routine for breakfast consumption, often varying in frequency or timing. Herein, "replace with snacks" refers to instances where participants consumed snack-like foods, such as energy bars, pastries, or other small, quick foods, instead of a traditional meal for breakfast. Notably, this study did not assess the specific quality or quantity of the breakfast consumed, including whether the meal was a full, balanced breakfast or consisted only of liquids or snacks. We categorized the responses into “regular breakfast,” “irregular breakfast or replace with snacks,” and “skip breakfast every day.”

Hypertension

Trained nurses assessed blood pressure with the aid of a mercury sphygmomanometer (ALPK, Tokyo, Japan) and a stethoscope after a 10-minute resting phase. Two readings were taken at

intervals of 1 to 2 minutes, with the mean value was calculated for analysis. If elevated blood pressure was detected, a third reading was conducted, and the average of the last two measurements was calculated. Blood pressure categories were defined according to the guidelines of the American Heart Association (9) and the Korean Society of Hypertension (10). A systolic blood pressure (SBP) ≥140 mmHg or a diastolic blood pressure (DBP) ≥90 mmHg was classified as hypertension. Participants with an SBP of 160 mmHg or higher, a DBP of 100 mmHg or higher, or those currently on antihypertensive treatment were excluded from the analysis (11).

Obesity

BMI was used to assess obesity and was calculated as weight in kilograms divided by height in meters squared. BMI is a commonly used measure that closely reflects body fat percentage and is widely accepted for obesity assessment. The WHO and Regional Office for the Western Pacific (12) define the obesity threshold for the Asia-Pacific region as ≥25 kg/m^2. We adopted this criterion to identify respondents with obesity.

Sleep duration, exercise frequency, stress level, and smoking status

To analyze the relationship of breakfast habits with hypertension and obesity, we considered the factors that could influence breakfast habits. These factors were sleep duration, exercise frequency, stress level, and smoking status. Participants were queried about their typical daily sleep duration and how many times per week they performed exercises lasting at least 30 minutes that caused sweating. The survey required respondents to assess their average stress level each day on a scale ranging from one to five. Respondents who indicated 'very high' or 'high' stress were placed in the high-stress category, whereas those reporting 'moderate,' 'low,' or 'very low' stress were grouped as low-stress. The respondents who answered "currently smoking" were considered smokers, whereas those who answered "used to smoke but not now" or "never smoked" were considered non-smokers.

Statistical analysis

Mean and standard deviation were used to describe continuous variables, while categorical variables were presented as percentages. To examine gender and age differences, the Mann-Whitney U test was applied to numerical data, while categorical variables were assessed using the chi-square test. Binomial logistic regression was utilized to investigate the relationship between breakfast habits and the likelihood of hypertension and obesity. Age, sleep duration, exercise frequency, stress level, and smoking status were included as covariates to more accurately evaluate the influence of breakfast habits. All statistical tests were performed with SPSS Statistics version 26.0 (IBM Corp., Armonk, NY, USA), and a significance threshold of $P<0.05$ was applied.

Results

Characteristics of the study population

Table 1 summarizes the demographic and clinical features of the participants.

Association between breakfast habits and hypertension among adults and older adults

Among adults aged 19–64 years, breakfast habits were significantly associated with hypertension (Table 2). Among men, having breakfast irregularly or replacing it with snacks was linked to a reduced likelihood of hypertension compared to having breakfast regularly (odds ratio [OR]=0.801, P=0.014), while skipping breakfast showed a marginally higher likelihood of hypertension (OR=1.239, P=0.056).

Table 1: Characteristics of the study population

Variables	Adults (n=2,779)			Older adults (n=623)			*P*	
	Male (n=1,653)	Female (n=1,126)	*P* (sex)	Male (n=263)	Female (n=365)	*P* (sex)	Age, male	Age, female
Age (yr)	38.10± 12.71	39.35± 13.06	0.016 *	72.21± 5.26	73.58± 5.85	0.005 **	<0.001 ***	<0.001 ***
Height (cm)	173.12± 6.08	160.02± 5.68	<0.001 ***	165.81± 5.53	153.86± 5.51	<0.001 ***	<0.001 ***	<0.001 ***
Weight (kg)	73.20± 9.71	57.00± 7.71	<0.001 ***	66.42± 7.99	56.66± 7.22	<0.001 ***	<0.001 ***	0.764
BMI (kg/m²)	24.41± 2.86	22.28± 2.95	<0.001 ***	24.14± 2.43	23.94± 2.85	0.479	0.265	<0.001 ***
SBP (mmHg)	125.63± 11.46	121.68± 11.78	<0.001 ***	125.97± 12.04	123.69± 11.12	0.015 *	0.578	0.005 **
DBP (mmHg)	77.37± 8.43	74.72± 9.13	<0.001 ***	75.02± 9.45	75.40± 9.20	0.740	<0.001 ***	0.273
Prevalence of hypertension (n, %)	257 (15.5%)	118 (10.5%)	<0.001 ***	46 (17.6%)	46 (12.7%)	0.094	0.408	0.232
Prevalence of obesity (n, %)	635 (38.4%)	180 (16.0%)	<0.001 ***	85 (32.4%)	130 (36.0%)	0.355	0.064	<0.001 ***
Regular breakfast	771 (46.6%)	1309 (47.1%)	0.041 *	206 (78.6%)	275 (76.2%)	0.771	<0.001 ***	<0.001 ***
Irregular breakfast or replace with snacks	606 (36.7%)	1045 (37.6%)		50 (19.1%)	77 (21.3%)			
Skip breakfast every day	276 (16.7%)	425 (15.3%)		6 (2.3%)	9 (2.5%)			
Sleep duration (hours per day)	6.60± 1.05	6.71± 1.08	0.009 **	6.47± 1.24	6.26± 1.23	0.041 *	0.064	<0.001 ***
Exercise frequency (days per week)	2.46± 1.91	2.24± 1.88	0.003 **	3.91± 2.15	3.57± 2.05	0.061	<0.001 ***	<0.001 ***
High stress (yes/no)	421 (25.5%)	258 (22.9%)	0.124	30 (11.5%)	48 (13.3%)	0.492	<0.001 ***	<0.001 ***
Smoker (yes/no)	473 (28.6%)	23 (2.0%)	<0.001 ***	39 (14.9%)	8 (2.2%)	<0.001 ***	<0.001 ***	0.841

Results are expressed as mean±standard deviation or frequency (%).
BMI, body mass index; SBP, systolic blood pressure; DBP, diastolic blood pressure
*P<0.05, **P<0.01, ***P<0.001; tested using independent t-tests, Mann–Whitney U Tests, and χ^2 tests

Among women, skipping breakfast was strongly associated with a higher likelihood of hypertension (OR=1.625, P=0.001), while having breakfast irregularly or replacing it with snacks increased the risk slightly (OR=1.214, P=0.053). Among male older adults, breakfast habits were not significantly associated with hypertension (Table 3). Among female older adults, having breakfast irregularly or replacing it with snacks was linked to a higher likelihood of developing hypertension (OR=1.578, P=0.019), whereas skipping breakfast had no significant effect.

Table 2: Effect of breakfast habits on hypertension among adults (aged 19–64 years)

Adults	Beta	Standard error	Wald	df	*P*	Odds ratio	95% confidence interval
Male							
Constant	0.151	0.299	0.255	1	0.613	1.163	
Regular breakfast			15.996	2	<0.001 ***		
Irregular breakfast or replace with snacks	-0.222	0.090	6.072	1	0.014 *	0.801	0.671–0.956
Skip breakfast every day	0.214	0.112	3.667	1	0.056	1.239	0.995–1.543
Age	-0.013	0.003	16.554	1	<0.001 ***	0.987	0.981–0.993
Sleeping duration (hours per day)	0.040	0.037	1.173	1	0.279	1.041	0.968–1.120
Exercise frequency (days per week)	-0.015	0.021	0.469	1	0.493	0.986	0.945–1.027
Stress level (high)	0.197	0.091	4.710	1	0.030 *	1.218	1.019–1.455
Smoking status (smoker)	0.031	0.088	0.126	1	0.722	1.032	0.869–1.225
Female							
Constant	-0.960	0.342	7.881	1	0.005 **	0.383	
Regular breakfast			12.143	2	0.002 **		
Irregular breakfast or replace with snacks	0.194	0.100	3.749	1	0.053	1.214	0.998–1.476
Skip breakfast every day	0.485	0.143	11.574	1	0.001 **	1.625	1.228–2.148
Age	0.035	0.004	87.397	1	<0.001 ***	1.036	1.028–1.044
Sleep duration (hours per day)	-0.056	0.043	1.724	1	0.189	0.946	0.870–1.028
Exercise frequency (days per week)	-0.113	0.026	18.977	1	<0.001 ***	0.893	0.849–0.940
Stress level (high)	0.102	0.109	0.869	1	0.351	1.107	0.894–1.372
Smoking status (smoker)	-0.019	0.312	0.004	1	0.951	0.981	0.532–1.809

*P<0.05, **P<0.01, ***P<0.001; tested using binomial logistic regression analysis

Association between breakfast habits and obesity among adults and older adults

Among male adults, breakfast habits were not associated with obesity (Table 4). Among female adults, not only having breakfast irregularly/replacing it with snacks (OR=1.795, P<0.001) but also skipping breakfast (OR=1.446, P=0.026) was significantly associated with a higher probability of obesity. Among older adults, breakfast habits did not show a significant relationship with obesity (Table 5).

Table 3: Effect of breakfast habits on hypertension among older adults (aged ≥65 years)

Older adults	Beta	Standard error	Wald	df	*P*	Odds ratio	95% confidence interval
Male							
Constant	0.259	1.582	0.027	1	0.870	1.295	
Regular breakfast			3.246	2	0.197		
Irregular breakfast or replace with snacks	-0.299	0.268	1.250	1	0.264	0.741	0.439–1.253
Skip breakfast every day	0.790	0.615	1.646	1	0.200	2.202	0.659–7.358
Age	0.010	0.019	0.293	1	0.588	1.010	0.974–1.048
Sleep duration (hours per day)	-0.073	0.085	0.752	1	0.386	0.929	0.787–1.097
Exercise frequency (days per week)	-0.091	0.046	3.923	1	0.048*	0.913	0.834–-0.999
Stress level (high)	0.194	0.311	0.390	1	0.533	1.214	0.660–2.235
Smoking status (smoker)	-0.815	0.320	6.494	1	0.011*	0.442	0.236–0.828
Female							
Constant	-0.571	1.190	0.230	1	0.631	0.565	
Regular breakfast			7.519	2	0.023*		
Irregular breakfast or replace with snacks	0.456	0.194	5.536	1	0.019*	1.578	1.079–2.308
Skip breakfast every day	-0.681	0.575	1.401	1	0.237	0.506	0.164–1.563
Age	-0.015	0.014	1.163	1	0.281	0.985	0.958–1.013
Sleep duration (hours per day)	0.296	0.070	17.831	1	<0.001***	1.344	1.172–1.542
Exercise frequency (days per week)	-0.107	0.039	7.454	1	0.006**	0.898	0.832–0.970
Stress level (high)	0.553	0.236	5.476	1	0.019*	1.738	1.094–2.762
Smoking status (smoker)	-0.407	0.620	0.430	1	0.512	0.666	0.197–2.246

*P<0.05, **P<0.01, ***P<0.001; tested using binomial logistic regression analysis

Table 4: Effect of breakfast habits on obesity among adults (aged 19–64 years)

Adults	Beta	Standard error	Wald	df	*P*	Odds ratio	95% confidence interval
Male							
Constant	-0.072	0.329	0.049	1	0.826	0.930	
Regular breakfast			0.778	2	0.678		
Irregular breakfast or replace with snacks	0.016	0.097	0.026	1	0.871	1.016	0.839–1.230
Skip breakfast every day	-0.094	0.127	0.546	1	0.460	0.911	0.710–1.167
Age	0.025	0.004	49.813	1	<0.001***	1.025	1.018–1.032
Sleep duration (hours per day)	-0.090	0.041	4.822	1	0.028*	0.914	0.843–0.990
Exercise frequency (days per week)	-0.052	0.023	5.146	1	0.023*	0.949	0.908–0.993
Stress level (high)	0.065	0.100	0.428	1	0.513	1.067	0.878–1.297
Smoking status (smoker)	0.149	0.096	2.418	1	0.120	1.160	0.962–1.400
Female							
Constant	-3.548	0.403	77.539	1	<0.001***	0.029	
Regular breakfast			28.439	2	<0.001***		
Irregular breakfast or replace with snacks	0.585	0.110	28.284	1	<0.001***	1.795	1.447–2.226
Skip breakfast every day	0.369	0.166	4.950	1	0.026*	1.446	1.045–2.001
Age	0.055	0.004	168.276	1	<0.001***	1.056	1.048–1.065
Sleep duration (hours per day)	0.086	0.045	3.626	1	0.057	1.090	0.997–1.191
Exercise frequency (days per week)	0.099	0.027	13.444	1	<0.001***	1.104	1.047–1.165
Stress level (high)	0.313	0.121	6.659	1	0.010*	1.368	1.078–1.736
Smoking status (smoker)	0.311	0.347	0.806	1	0.369	1.365	0.692–2.694

*$P<0.05$, **$P<0.01$, ***$P<0.001$; tested using binomial logistic regression analysis

Table 5: Effect of breakfast habits on obesity among older adults (aged ≥65 years)

Older adults	Beta	Standard error	Wald	df	*P*	Odds ratio	95% confidence interval
Male							
Constant	4.384	1.791	5.990	1	0.014*	80.192	
Regular breakfast			0.083	2	0.959		
Irregular breakfast or replace with snacks	-0.083	0.301	0.076	1	0.783	0.920	0.510–1.661
Skip breakfast every day	0.043	0.728	0.004	1	0.953	1.044	0.251–4.350
Age	-0.052	0.022	5.711	1	0.017*	0.950	0.910–0.991
Sleep duration (hours per day)	-0.078	0.090	0.758	1	0.384	0.925	0.776–1.103
Exercise frequency (days per week)	-0.031	0.053	0.338	1	0.561	0.969	0.873–1.076
Stress level (high)	-0.348	0.366	0.905	1	0.341	0.706	0.345–1.446
Smoking status (smoker)	-0.134	0.329	0.165	1	0.684	0.875	0.459–1.667
Female							
Constant	2.387	1.351	3.124	1	0.077	10.885	
Regular breakfast			0.384	2	0.825		
Irregular breakfast or replace with snacks	0.122	0.225	0.295	1	0.587	1.130	0.728–1.754
Skip breakfast every day	-0.145	0.608	0.057	1	0.811	0.865	0.263–2.844
Age	-0.029	0.016	3.264	1	0.071	0.971	0.941–1.002
Sleep duration (hours per day)	-0.038	0.075	0.248	1	0.618	0.963	0.831–1.117
Exercise frequency (days per week)	0.015	0.045	0.119	1	0.730	1.016	0.930–1.109
Stress level (high)	0.264	0.271	0.944	1	0.331	1.302	0.765–2.216
Smoking status (smoker)	0.180	0.623	0.083	1	0.773	1.197	0.353–4.058

*P<0.05, **P<0.01, ***P<0.001; tested using binomial logistic regression analysis

Discussion

Association between breakfast habits and hypertension

The findings highlight significant differences regarding how breakfast habits influence hypertension in male and female adults aged 19–64. For male adults, irregular breakfast consumption or substituting breakfast with snacks was linked to a reduced likelihood of hypertension, whereas skipping breakfast slightly elevated this risk. In contrast, skipping breakfast significantly increased the probability of developing hypertension among female adults.

Prior studies frequently indicate a connection between irregular breakfast patterns and high cardiovascular risk, regardless of sex. The discrepancy with results from previous studies may have stemmed from several factors. First, sex-based differences in metabolic responses to dietary pat-

terns may have led to different effects on blood pressure. Previous research has suggested that hormonal differences, such as those in testosterone and estrogen levels, play important roles in shaping metabolic responses to food intake (13). Second, the type of snacks one eats in place of breakfast can greatly vary in terms of nutritional content, which may modify the effect of breakfast on blood pressure. Ofori-Asenso et al (13) reported that the nutritional composition of meals can modulate cardiovascular risk factors. Our finding that irregular breakfast consumption/replacement with snacks is associated with a lower probability of hypertension than regular breakfast consumption among male adults should be interpreted cautiously because the study did not account for the quality or type of breakfast consumed.

Furthermore, our results revealed that high levels of stress increase the probability of hypertension among male adults. This result supports that of Spruill (14), who found that stress can significantly contribute to hypertension by inducing sympathetic nervous system activation and subsequent blood pressure elevation. However, this result was not found among adult women. Women may utilize various strategies for stress management, such as social support and emotional expression, which can attenuate the physiological impact of stress on blood pressure (15). Among male older adults, breakfast habits were not associated with hypertension; interestingly, smoking was associated with a lower probability of hypertension. This paradoxical finding might be because smokers who survive to older age are individuals who have potentially better cardiovascular health than those who do not survive. Among female older adults, irregular breakfast consumption or replacement with snacks was significantly associated with a high probability of hypertension, but skipping breakfast did not have a significant impact. Having breakfast irregularly or replacing it with snacks can lead to fluctuations in caloric intake, potentially resulting in blood sugar spikes that contribute to hypertension by disrupting normal metabolic rhythms and increasing blood pressure (16). In addition, longer sleep duration was associated with a high probability of hypertension among female older adults. Prolonged sleep duration can sometimes indicate poor sleep quality, which may increase stress levels and disrupt circadian rhythms and, consequently, contribute to elevated blood pressure (17). This study found an inverse relationship between exercise frequency and hypertension among adults and older adults. This result supports the result of Seals et al (18), who found that regular physical activity can reduce blood pressure and improve cardiovascular health.

Association between breakfast habits and obesity

Among male adults, breakfast habits were not found to be associated with obesity. This finding is consistent with the inconsistent evidence reported by Rampersaud et al (19) on the relationship between skipping breakfast and obesity. We also found that longer sleep duration and frequent exercise were associated with a reduced probability of obesity among male adults. These findings reinforce the well-known benefits of adequate sleep and regular physical activity for weight management (20). However, among female adults, breakfast habits were significantly associated with obesity. Irregular breakfast consumption/replacement with snacks as well as skipping breakfast were associated with a higher probability of obesity. This finding aligns with the study by Ma et al (21), which reported a strong association between skipping breakfast and high BMI among women. Interestingly, among female adults, more frequent exercising was also associated with an increased probability of obesity. This increased probability of obesity may have led to increased caloric intake or muscle mass rather than fat mass.

Among older adults, breakfast habits were not associated with obesity. These findings align with those of Morgan et al (22), who reported that breakfast patterns have little influence on obesity risk in older adults. As people age, their metabolic rate decreases and body composition changes. This often increases fat mass and decreases muscle mass. These physiological changes can over-

shadow the influence of lifestyle habits, such as breakfast consumption (22). This study uniquely focuses on the differential effects of breakfast habits across age and sex groups. Although skipping breakfast was generally linked to negative outcomes, it may provide benefits in certain contexts, such as intermittent fasting, where it can promote autophagy. Meal timing and quality are also important factors to consider.

This study has several limitations, hindering the establishment of causal relationships between breakfast habits and health outcomes. First, this study did not control for several important confounding variables known to influence hypertension and obesity, such as genetic predisposition and socioeconomic factors. Additionally, the research did not reflect the specific quality or quantity of breakfast consumed, nor did it establish a defined recall period. These limitations might have influenced the observed associations between breakfast habits and health outcomes, potentially introducing recall bias. Second, categorizing former smokers as non-smokers may have introduced variability into the results, as we could not account for the varying lengths of time since smoking cessation. This classification was made following standard epidemiological practices, given that former smokers are no longer engaging in active risk behavior. Third, the cross-sectional study design only captured one time point, limiting the observation of long-term changes in breakfast habits and their effects on health over time. Because this study utilized a data set from 2015, the potential impact of the data collection period on the results must also be considered. Nevertheless, the relationships among breakfast habits and health outcomes such as hypertension and obesity likely remain relevant. Future research should compensate for these limitations to enhance the precision and dependability of the results.

Conclusion

We explored the connection between breakfast habits and hypertension and obesity risks among Korean adults and old adults, with a focus on age-based and sex-based differences. Our findings demonstrate that among women aged 19–64 years, skipping breakfast was linked to an increased likelihood of developing both hypertension and obesity. For men aged 19–64 years, having breakfast irregularly or replacing it with snacks was linked to a reduced likelihood of hypertension, while skipping breakfast showed a marginally higher chance of hypertension. For older women, irregular breakfast consumption or replacing it with snacks was linked to a higher likelihood of developing hypertension. No notable link was identified between breakfast habits and obesity among men and older adults. Notably, regular physical activity emerged as a key factor in reducing the risk of hypertension in both male and female older adults. These findings suggest that tailored public health strategies that promote regular breakfast consumption and physical activity could be beneficial in reducing the risks of hypertension and obesity, particularly among women and older adults.

Journalism Ethics considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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Conflict of Interest

The author declares no conflicts of interest.

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