

The effect of brisk walking on overweight and obesity in occupational population

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Abstract. Purpose: To analyze the effect of brisk walking on overweight and obesity in occupational population, and explore the prevention and control strategies for chronic diseases in occupational population. Methods: 610 persons who volunteered to participate in the “Wanbu Youyue” brisk walking event held in Xicheng District, Beijing in 2019 were selected as the study objects, and 100 days of brisk walking and lectures on knowledge of brisk walking were used for intervention. The waist circumference, body mass index (BMI), body fat rate and other indicators before and after the competition were collected by on-site physical examination, and the changes in these indicators before and after the competition were compared and analyzed. Results: After the brisk walking event, the waist circumference, BMI and body fat rate of the participants decreased by 3.84 cm, 0.64 kg/m², and 4.38% respectively, and the differences were statistically significant (all $P < 0.05$). After the brisk walking event, the overweight, obesity and concentric obesity rates decreased by 2.62%, 6.72%, and 9.02% respectively, and the differences were statistically significant (all $P < 0.05$). Conclusion: Brisk walking can reduce the rates of overweight, obesity and concentric obesity in the occupational population, and it is an effective measure to prevent and control chronic diseases.

Keywords. Brisk walking, overweight, obesity.

With the improvement of people’s living standards and the changes in dietary structure and lifestyle in recent years, obesity has gradually become a common phenomenon in society [1]. Overweight and obesity are not only chronic diseases, but also the main risk factors of hypertension, diabetes, cardiovascular and cerebrovascular diseases, and other chronic diseases [2]. With the progress of science and technology, the production methods and lifestyles of the occupational population have changed dramatically. Relevant surveys show that 31.0% of the respondents in the occupational population never take exercise, 14.6% of the respondents spend more than 4 hours sitting quietly in their spare time, and unhealthy lifestyles involving long working hours and lack of exercise are common [3]. Brisk walking does not require special venue or equipment, is with high safety, low personal investment and easy control of exercise intensity, so it is the most suitable sporting activity for the masses [4]. In order to explore a long-term prevention and control mechanism for chronic diseases, Xicheng District of Beijing continued to participate in the “Wanbu Youyue” brisk walking event held by the Chinese Center for Disease Control and Prevention in 2019. This study collected the relevant data of 610 participants before and after brisk walking, analyzed and compared the changes in overweight, obesity, concentric obesity and other indicators before and after brisk walking intervention, and analyzed the relationship between the brisk walking intensity and the changes in BMI, waist circumference, body fat rate and other indicators. The results are reported as follows.

1. Objects and methods

1.1. Objects.

The study objects were the people who participated in the “Wanbu Youyue” brisk walking event in Xicheng District, Beijing in 2019. They were mobilized from public institutions of Xicheng District, participated voluntarily, had good health conditions and could persist for 100 days without engaging in other physical exercise, weight loss, dieting.

1.2. Methods

1.2.1. Brisk walking

The participants were divided into different teams according to their employers, with 10-20 persons in each team. During the 100 days from May 11 to August 18, 2019, they wore special pedometers and walked at least 10000 steps a day. The walking requirement was walking at least 3000 steps in the morning and 4000 steps in the evening, and completing 10, 10, and 15 minutes of brisk walking every day at a pace of 100-150 steps/min. They uploaded the data to the competition platform timely, and the team leader urged the team members to complete the daily tasks. In order to improve the enthusiasm of the participants, health lectures, field walking, essay contest and incentive mechanisms were launched during the period.

1.2.2. Collection of physical indicators

Before and after the brisk walking event, on-site physical measurement was done, the body composition was measured with Tsinghua Tongfang Body Tester (BCA-1C), and waist circumference, BMI, body fat rate and other indicators were collected.

1.3. Definition and judgment criteria

The 10000-step rate is the proportion of the days of walking for 10000 steps or more every day, that is, days of walking for 10000 steps/total days, which reflects the brisk walking intensity of the participants. A 10000-step rate < 80% is low level, 80%~99% is medium level, and 100% is high level. The abnormal BMI is used to measure the general overweight and obesity. The overweight and obesity in this paper refer to the general obesity, and the abnormal waist circumference is used to measure the concentric obesity. $24\text{kg/m}^2 \leq \text{body mass index (BMI)} < 28\text{kg/m}^2$ indicates overweight, $28\text{kg/m}^2 \leq \text{BMI}$ indicates obesity [5]; male waist circumference $\geq 90\text{cm}$ or female waist circumference $\geq 85\text{cm}$ indicates concentric obesity [6].

1.4. Statistical analysis

Excel 2010 software was used for data sorting, and SPSS 21.0 software was used to analyze the measurement results before and after the competition. The measurement data were described by $\bar{x} \pm s$, and paired t test and variance analysis were used for comparison between groups; the counting data were described by frequency and percentage, and χ^2 and Wilcoxon rank sum tests were used for comparison between groups, the test level $\alpha = 0.05$, which is a two-sided test.

1.5. Quality control

Body composition tester (model: BCATC) is used to measure body composition, including body weight, BMI and body fat rate. The staff are professionals from the wanbu.com.cn and the center for disease control and prevention. During the indicator measurement, staff from the Beijing Center for Disease Control and Prevention were on site for quality control.

2. Results

2.1. Basic information

The data of 610 participants were included in the analysis, including 316 males and 294 females, with an average age of (41.82 ± 9.46) years. The high-level 10000-step rate was 14.59%, the medium-level 10000-step rate was 33.11%, and the low-level 10000-step rate was 52.30%.

2.2. Changes in BMI and overweight/obesity rate

The BMI of the study objects before brisk walking (24.68 ± 3.99) kg/m^2 was higher than that after brisk walking (24.04 ± 3.44) kg/m^2 , and the difference was statistically significant ($t=2.288$, $P=0.043$). The overweight, obesity rate and other indicators after brisk walking were lower than those before brisk walking, and the difference in the compositions of different weight types was statistically significant ($Z=-8429$, $P<0.001$). See Table 1.

Table 1. Changes in overweight/obesity rate of male and female participants before and after brisk walking

Item	Before brisk walking		After brisk walking		Z value	P value
	Number	Ratio (%)	Number	Ratio (%)		
Male						
Normal	113	35.76	145	45.89	-7.595	<0.001
Overweight	130	41.14	119	37.66		
Obesity	73	23.10	52	16.46		
Female						
Normal	130	44.22	155	52.72	-4.129	<0.001
Overweight	115	39.12	110	37.41		
Obesity	49	16.67	29	9.86		
Total						
Normal	243	39.84	300	49.18	-8.429	<0.001
Overweight	245	40.16	229	37.54		
Obesity	122	20.00	81	13.28		

2.3. Changes in waist circumference and concentric obesity rate

The waist circumference after brisk walking (80.21 ± 10.19) cm was lower than that before brisk walking (84.05 ± 7.64) cm, and the difference was statistically significant ($t=6.044$, $P<0.001$). The concentric obesity rate of male, female and all research objects after brisk walking was lower than that before brisk walking, and the difference was statistically significant. See Table 2.

2.4. Changes in body fat rate

After brisk walking, the body fat rate of male, female and all participants decreased, and the difference was statistically significant. See Table 3.

Table 2. Changes in concentric obesity of male and female participants before and after brisk walking

Item	Before brisk walking		After brisk walking		x ² value	P value
	Number	Ratio (%)	Number	Ratio (%)		
Male						
Normal	164	51.90	194	61.39	5.799	0.016
Concentric obesity	152	48.10	132	41.77		
Female						
Normal	188	63.95	213	72.45	8.309	0.004
Concentric obesity	106	36.05	71	25.0		
Total						
Normal	352	57.70	407	66.72	10.547	<0.001
Concentric obesity	258	42.30	203	33.28		

Table 3. Changes in body fat rate (%) of male and female participants before and after brisk walking

Item	Before brisk walking	After brisk walking	t value	P value
Male	27.69±7.09	22.87±3.10	5.990	<0.001
Female	37.33±3.93	31.80±4.03	7.892	<0.001
Total	29.84±5.77	25.46±6.01	8.492	<0.001

2.5. Changes in physical indicators in different 10000-step rate groups

After 100 days of brisk walking, the decrease ranges of BMI, waist circumference and body fat rate increased with the increase of walking intensity, and the difference was statistically significant. See Table 4.

Table 4. Changes in BMI, waist circumference and body fat rate in different walking level groups

10000-step level	Number of persons	BMI (kg/m ²)	Waist circumference (cm)	Body fat rate (percentage points)
Low level	319	-0.52 ±0.04	-3.18±0.79	-2.83 ± 1.00
Medium level	202	-0.65 ±0.08	-3.66±1.01	-4.16±1.28
High level	89	-0.90 ±0.12	-4.36±1.71	-6.26±2.35
F value		86.993	49.368	135.472
P value		<0.001	0.031	<0.001

3. Discussion

This survey shows that after brisk walking, the BMI decreased by 0.64kg/m², and the overweight and obesity rates also decreased by 2.62% and 6.72% respectively. The maintenance of healthy weight of adults mainly depends on the balance between energy intake and consumption [7]. During the brisk walking competition, the energy consumed by the participants every day was higher than that before the competition, so the weight and BMI decreased, and the rates of overweight and obesity also decreased. This is basically consistent with the study results of Shunyi District and Chaoyang District in Beijing [8-9]. Recently, Chinese researchers published the disease burdens and death risk factors in China from 1990 to 2017, which suggested that stroke and ischemic cerebrovascular diseases were the leading causes of death in China, but the analysis of the top ten disease risk factors increased the fastest was high BMI [10], which further suggested that the prevention and treatment of overweight and obesity are urgent. Body fat rate refers to the percentage of body fat in body weight. When determining the obesity level of a person, it is easy to ignore the body fat content if BMI is used as the reference indicator alone. This study found that the body fat rate of brisk walkers decreased, suggesting that risk walking not only can control weight, but also is an effective way to reduce body fat [11-12]. Brisk walking can achieve the goal of preventing and controlling a variety of chronic diseases by controlling BMI and reducing body fat rate.

Body fat rate reflects the content of body fat, while waist circumference reflects the accumulation of visceral fat in the abdomen. It has been reported that patients with concentric obesity have a higher risk of disease than those with general obesity. The prevalence and mortality of coronary heart diseases increased when BMI only slightly increased but waist circumference was larger [6]. Through the brisk walking activity, the waist circumference of the participants decreased by 3.84 cm, and the concentric obesity rate decreased by 9.02%, indicating that brisk walking, as a low to medium degree aerobic exercise, can accelerate fat burning, oxidize and decompose fat substances, and reduce the total amount of fat. In particular, the reduction of visceral fat is better than the reduction of subcutaneous fat, which improves the fat distribution in the body [13], thus achieving the effect of physical fitness. In addition, this study also further analyzed the relationship between the intensity of brisk walking and the decline range of body indicators. With the increase of brisk walking intensity, the decline range of body indicators presented an upward trend, suggesting that the intensity of brisk walking is an important factor affecting the fitness effect of brisk walking, which should be paid attention to when carrying out brisk walking activity.

In conclusion, brisk walking has obvious effect on the overweight and obesity rates of the intervention population, and long-term regular fitness exercise has a good role in promoting health [14]. This study also has some limitations. The research sample size is not large enough, and the participants are willing to participate, so their compliance may be higher than that of other occupational populations who have not participated. In the future brisk walking activities, we should increase the fun of the competition to attract more participants, increase the intensity of brisk walking, extend the intervention time, increase the knowledge, belief and practice of the participants, and strengthen the collection of blood

biochemical indicators and the relevant research work.

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