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Obesity, Walking and Kidneys

I. I. Islomov[1,*], A. G. Gadaev[2]

[1]Urgench branch of Tashkent Medical Academy, Elite Clinic at Shifo Quvonch Fayz Ltd, Urgench, Uzbekistan
[2]Tashkent Medical Academy, Tashkent, Uzbekistan

Abstract Physical activity leading an active lifestyle is one of the pragmatic approaches to reduce the health and socio-economic costs associated especially with obesity. On this basis, we need physical activity guidelines for obese patients. Objective to assess walking duration in metabolically healthy obese patients on the functional state of the kidneys. Compared with glomerular filtration rate, renal functional reserve assessment allows a more accurate assessment of renal function. Walking, which is one of the methods of non-medicinal treatment, in turn has a positive effect on renal functional status. Our study revealed that this positive effect also depends on the intensity and duration of walking. As it was established, the rate of improvement of renal functional reserve was significantly and convincingly higher for the walkers who engaged in walking for 1 hour or more a day as compared to those who walked for about 30 minutes a day.

Keywords Renal functional reserve, Glomerular filtration rate, Kidneys, Creatinine, Walking

1. Introduction

One of the pragmatic approaches aimed at reducing medical and socio-economic spending associated with obesity is the development of priorities for patients who are exactly interested in reducing body weight [1, p. 60-75].

Such stratification requires modern developments necessary to assess the risk of obesity-related morbidity and mortality. There have been a number of scientific studies on obesity and several related changes, including functional changes in the kidneys, to some extent reversible [5, p. 180-183].

Obesity contributes to reduced life expectancy, impaired quality of life, and disabilities, mainly in those individuals who develop cardiovascular diseases, type 2 diabetes, osteoarthritis, and cancer. However, there is a large variation in the individual risk to developing obesity-associated comorbid diseases that cannot simply be explained by the extent of adiposity. Observations that a proportion of individuals with obesity have a significantly lower risk for cardiometabolic abnormalities led to the concept of metabolically healthy obesity (MHO). Although there is no clear definition, normal glucose and lipid metabolism parameters-in addition to the absence of hypertension-usually serve as criteria to diagnose MHO and Metabolically healthy obesity should not be considered a safe condition, which does not require obesity treatment, but may guide decision-making for a personalized and risk-stratified obesity treatment [2, p. 405–420].

Lack of physical activity (PhA) is the main cause of most chronic diseases and is responsible for accelerating biological aging, which is becoming one of the risk factors for early death around the World [3, p. 2331–2378].

Physical activity has established protective effects on health, and its potential benefits span across the prevention, management, and treatment of cardiovascular disease (CVD) [7, p. 274-280]. Sedentary behavior (SB) represents the lowest end of the physical activity spectrum and is commonly defined as a low energy expenditure of <1.5 metabolic equivalents (MET) in a sitting or reclining posture during waking hours [8, p. 540-542]. The links among SB, mortality, and cardiovascular disease are not always well understood [4, p. 2062–2072].

The awareness of the population about the dangers of literacy and obesity, and the fact that a healthy lifestyle, including proper nutrition and physical activity and exercise, help prevent obesity and kidney disease, are reflected in several literature [5, p. 180-183].

2. Objective

Evaluation of duration of walking in patients with metabolic healthy obesity affects the functional state of the kidneys. That is, the purpose of this work is to study the extent to which it affects the functional state of the kidneys, depending on how long it is walked for a day and how long the duration of this walk lasts.

3. Material and Methods

In total 123 individuals, including 83 individuals with

* Corresponding author:
md.inomjon.islomov@gmail.com (I. I. Islomov)
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metabolic healthy obesity at levels 1 and 2, 20 practical healthy individuals from the South Aral Sea Region, 10 practically healthy individuals from the Qibray District of the Tashkent region, and 20 individuals with metabolic healthy obesity were selected. They were between 25 and 50 years old and averaged 36.83±0.72. Females made up 45 (54.21%). All individuals were placed on outpatient observation and separated into primary and control groups. The core group was divided into 2 groups based on body mass index (BMI): 1 group was made up of 46 individuals with metabolic healthy obesity comprising BMI 30-34.9 kg/m2,2 groups were made up of 37 individuals with metabolic obesity comprising BMI 35-39. 9 kg/m^2. The control group was made up of 20 practically healthy individuals from the South Islet Region, 10 practically healthy individuals from the Qibray District of the Tashkent region and 20 individuals with metabolic healthy obesity.

4. Results and Discussion

One of the tasks set before us when considering the above and performing this scientific study was the application of The Walking method to patients involved in our study, one of the approaches without drugs that positively affect the functional state of the kidneys in metabolic obesity, and in this study we studied the effect of walking on the functional state of the kidneys and We used the updated recommendations of the American sports community from 2019-2021 when ordering hiking downloads to patients [6, p. 1-252]. According to these recommendations, each obese patient was advised to walk longer than 30 minutes in a day and more than 5 days in a week, until they reached indicators up to 40-60% of the maximum limit of the number of heartbeats determined by their age.

A comparative analysis of the indicators of the functional indicators of the kidneys and body weight index after the 3rd and 6th month of the initial and follow– up of patients from the group I and II of the basic group of patients involved in the study was carried out. In this case, patients were identified according to the intensity of physical activity (this intensity was determined by analyzing how long they walked from patients in one day, according to which it was known that some patients walked for 30 minutes in one day, and some walked for 1 hour or more) in small 2 groups, and they were conditionally called “active” and “passive” walkers.

In Group I, patients, this indicator, when the observation and pre-intervention GFR was examined in the group of passive walkers, was 113.49±1.61 ml/min/1.73 m2, while in the 3rd month of the Walk This indicator was 110.47±1.60 ml/min/1.73 m2, and by the 6th month of the study, the GFR indicator was 111.75±1.65 ml/min/1.73 m2 (p>0.05). In the case of functional reserve of kidneys (FRK), however, the following results were recorded: the average FRK before observation and intervention was 5.74±0.77%, while the average of this indicator in the 3rd month of observation was 8.10±0.82%, and by the 6th month of examination was 11.12±1.02% (p<0.001). In order to more accurately represent such a growth rate of dynamism, we will consider dividing patients into 3 groups according to the types of FRK condition. It is known that we divided each of the main group into groups that, according to the FRK, had no reserves, decreased and saved. Earlier in the study, the ratio of this group I of passive walkers to the initial FRK rates was as follows: the number of patients without FRK was 11 (61.11%), patients with a decrease in FRK was4 (22.22%), and the number of patients with FRK retention was 3 (16.67%). While by 6 months of the study no FRK patients had decreased from 11 to 5 (27.78%), the number of patients with a decrease in FRK was 4, and all of these patients joined the FRK-maintained patient line-up to 13 total FRK-maintained patients (72.22%), eventually the growth rate of FRK averages increased by 41 and 37%, respectively in 3 and 6 months, compared to the previous FRK monitoring and intervention was found to have increased by 94% ($\chi2$=14,309, p=0,014).

In active Walker patients of the same group, this indicator, when observed and pre-intervention GFR was examined, was 117.37±1.46 ml/min/1.73 m2, while in the 3rd month of the walk, this indicator was 117.97±1.77 ml/min/1.73 m2, and by the 6th month of the study, the GFR indicator was 117.34±1.49 ml/min/1.73 m2 (p>0.05). In the case of FRK, however, the following results were recorded: the average FRK before observation and intervention was 10.58±0.80%, while in the 3rd month of observation, the average of this indicator was 12.68±0.86%, and by the 6th month of examination was 17.11±1.34% (p<0.001). To more accurately represent such a growth rate of dynamism, we will once again consider dividing patients into 3 groups according to the types of FRK condition. It is known that we divided each of the main group into groups that, according to the FRK, had no reserves, decreased and saved. Earlier in the study, the ratio of this group I of active walkers to the initial FRK rates was as follows: the number of patients without FRK was 3 (10.71%), patients with a decrease in FRK was 6 (21.42%), and the number of patients with FRK retention was 19 (67.85%). By the 6th month of the study, the number of patients with a decrease in FRK had increased from 6 to 10 and reached 35.71%, while the number of patients with FRK retention reached 18 out of 19 (64.29%), with patients with an absence of FRK not observed in the 6th month of the study, as patients with When the FRK average growth rate was checked with an interval of every 3 months compared to the previous indicators, i.e. 20 and 35% in 3 and 6 months respectively, the initial FRK indicator was found to have increased by 62% by the 6th month of observation and intervention ($\chi2$=14.309, p=0.014).

When we also analyzed the above indicators in the representatives of the Group II of our study, the results were noted as follows: in the group of active walkers, when the observation and pre-intervention GFR was examined, this indicator was 127.64±2.69 ml/min/1.73 m2, while in the 3rd month of the Walk, This indicator was 129.24±2.94 ml/min/1.73 m2, (p>0.05). In the case of FRK, the following results were recorded: the average FRK before observation and intervention was 8.05±0.98%, while the average of this indicator in the 3rd month of observation was 10.34±1.17%, and by the 6th month of examination was 14.19±1.27%, in which the results differed significantly before and after treatment and compared to the control group ($p<0.001$). In order to more accurately represent such a growth rate of dynamism, we will consider dividing patients into 3 groups according to the types of FRK condition. It is known that we divided each of the main group into "no", "dropped" and "saved" groups of reserves according to the FRK. Earlier in the study, the ratio of this II group of active walkers to the initial FRK indicators was as follows: the number of patients without FRK was 8 (42.10%), patients with a decrease in FRK was 8 (42.10%), and the number of patients with FRK retention was 3 (15.79%). By 6 months of the study, no FRK patients were observed at all, that is, due to their improvement in FRK, these group patients were added to the FRK decreased and stored groups, the number of patients with a decrease in FRK decreased from 8 to 4, this decrease occurred due to the addition of FRK to the group of saved among them, ultimately the growth rate of, the initial FRK indicator was found to have increased by 76% by the 6th month of observation and intervention ($\chi2$=17,927; p=0,003). In passive walking patients of the same group, this indicator, when examined for observation and pre-intervention GFR, was 119.03±2.89 ml/min/1.73 m2, while in the 3rd month of the Walk This indicator was 119.43±3.66 ml/min/1.73 m2, and by the 6th month of the study, the GFR indicator was 115.65±3.35 ml/min/1.73 m2 ($p>0.05$). In the case of FRK, however, the following results were recorded: the average FRK before observation and intervention was 4.66±0.79%, while in the 3rd month of observation, the average of this indicator was 5.77±0.87%, and by the 6th month of examination was 7.78±0.92% ($p<0.001$). To more accurately represent such a growth rate of dynamism, we will once again consider dividing patients into 3 groups according to the types of FRK condition. It is known that we divided each of the main group into groups that, according to the FRK, had no reserves, decreased and saved. Earlier in the study, the ratio of this group I of active walkers to the initial FRK rates was as follows: the number of patients without FRK was 13 (76.20%), patients with a decrease in FRK was 3 (17.00%), and the number of patients with FRK retention was 1 (5.80%). By the 6th month of the study, the number of patients without FRK was 4 (23.50%), patients with a decrease in FRK was 11 (64.70%), and the number of patients with FRK was 2 (11.70%), with improvements in FRK being due to an increase in patients with FRK storage. When the growth rate of FRK averages was tested with an interval of every 3 months compared to previous indicators, i. e. 24 and 35% in 3 and 6 months respectively, the initial FRK indicator was found to have increased by 67% by the 6th month of observation and intervention ($\chi2$=17,927, p=0.003).

In control group patients, the following changes were noted in indicators representing the functional state of the kidneys: in practically healthy individuals involved in the study from the southern insular districts, the post-initial and 6-month follow-up changes of GFR were 111.12±2.32 and 118.11±1.24 l/min/1.73 m2, FRK indicators 22.28±2.75 and 25.16±3.08% respectively, body weight indicators before and 6 months after BMI 23.37±0.43 and 24.18±0.71 kg/m2, body weight 68.55±1.38 and 70.08±1.13 kg ni, waist circumference measurements were 83.30±1.39 and 83.26±1.18 cm, respectively. The changes of the control group in the practically healthy individuals attracted to the observation from the Qibray district, however, were noted as follows: the initial and post-6th-month follow-up changes of GFR were 124.13±2.32 and 126.10±1.13 l/min/1.73 m2, FRK indicators 27.96±5.96 and 28.53±5.58% respectively, body weight indicators i.e. BMI before and after 6 months respectively 22.83±0.50 and 23.21±0.64 kg/m2, body weight was 68.40±1.94 and 72.34±1.74 kg respectively, and waist circumference (WC) dimensions were 79.00±1.02 and 81.42±1.12 sm respectively.

When the correlation coefficient of the FRK indicator with the above States is studied, the correlation between FRK and body weight at a convincing degree of negative mean force ($r=-0.48$, $p<0.05$), the negative weak correlation between WC ($r=-0.29$, $p<0.05$), the negative mean force correlation between BMI ($r=-0.62$, $p<0.05$), and the negative strong correlation between systolic arterial blood pressure ($r=-0.86$, $p<0.05$).

5. Conclusions

Compared to GFR, FRK detection allows a more accurate assessment of kidney function. Walking, which is one of the methods of treatment without drugs, in turn has a positive effect on the functional state of the kidneys. It became known as a result of our study that this positive effect also depends on the intensity and duration of walking. Because the rate of FRK improvement between walkers 1 hour a day and more has been found to be significantly and convincingly high compared to walkers around 30 minutes a day. Thus, it is evident from the above changes that obesity has a negative effect on the indicators of the functional state of the kidneys. Especially when assessing kidney function, it is recommended to pay more attention to FRK than to GFR indicators, since, as mentioned above, based on the correlation coefficients between these indicators, it can be said that the higher the body weight and its index, as well as the systolic arterial pressure indicators, the lower the functional reserve of the kidneys.

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