

Publication date: 01.12.2023
DOI: 10.24412/2782-6570-2023_02_04_5
UDC 616-056.52; 615.825

EFFECTS OF HYDROKINESIOTHERAPY IN 18-20 YEARS OLD PATIENTS WITH OBESITY

N.V. Lunina^{1,2}, A.A. Pustokhina¹

¹Russian University of Sports "GTSOLIFK", Moscow, Russia

²FSBI "North-Caucasian Federal Research and Clinical Center of the Federal Medical and Biological Agency", Essentuki, Russia

Annotation. The article presents the effects of hydrokinesiotherapy in 18-20 years old patients with obesity. The course lasted 12 weeks with a gradual increase in the complexity of the measures used and forms of sessions. At the end of the course, body mass significantly decreased by 21.7%, body mass index – by 27%, waist girth – by 23.3% and hip girth – by 25.8%. Results of the respiration test on inhale increased by 83%, results of the respiration test on exhale – by 80%, the Ruffier test's results – by 29%. The arm strength endurance increased by 150%, the leg strength endurance – by 76.9%. The results obtained convincingly demonstrate the positive effects of hydrokinesiotherapy in 18-20 years old patients with obesity, improving their physical and functional status.

Keywords: hydrokinesiotherapy, obesity, anthropometric indices, cardiorespiratory system, strength endurance.

Introduction. Epidemiology of obesity and excessive weight among adult population of Russia depends on the region [1-2] and amounts to 20.5-54% in average. Obesity increases the risk of occurrence and complicates the course of diseases from the organs' function and various systems of the body (cardiovascular, endocrine, reproductive, nervous, musculoskeletal, metabolic systems), increasing obstructive sleep apnea [3]. Diseases associated with obesity significantly worsen quality of life, lead to disability and early death [4].

Obesity can lead to decreased muscle strength [5], motor [6] and coordination disorders [7-8]. Taking the aforementioned into account, the correction of the existing deviations associated with obesity should be comprehensive with a significant increase in motor activity [9], mainly the aerobic type. Due to the unique properties of water, hydrokinesiotherapy is successfully applied in treating obesity [10-11], in the rehabilitation of diseases of various areas [12], in the restoration of performance [13].

Objective of the study: to examine effects of hydrokinesiotherapy in 18-20 years old patients with obesity.

Methods and organization. The study took place in the "Fitzal" fitness club (Moscow). It included 6 male patients, age – 18-20 years, the degree of obesity was determined by calculating body mass index with values ranging from 30.0 to 34.9 kg/m².

We assessed following anthropometric indices: body mass (kg), hip girth (cm), waist girth (cm), identified body mass index (BMI, kg/m²). We also evaluated the cardiorespiratory system's activity with the respiration tests (the respiration tests on inhale and exhale) and the Ruffier test. The lower limb's strength endurance was estimated with squats, upper limb's strength endurance – with push-ups. We recorded the number of reps in 30 seconds.

The hydrokinesiotherapy course took 12 weeks and included 3 periods: adaptation (3 weeks), training and corrective (7 weeks), stabilizing (2 weeks), each of them had different tasks, means and forms for completing these tasks, different activity.

The adaptation period included physical exercises on land and in water with and without objects; breathing exercises (in water as well); stretching exercises (horizontal, vertical); isometric contraction of limb muscles; exercises in water on the spot and in motion;

therapeutic swimming in the incomplete coordination (using legs) with the use of supporting equipment for the arms; relaxation exercises were conducted at the end of the sessions – deep and even breathing with closed eyes while lying on the back on the water. The sessions were held 3 times a week, total duration – 30-35 minutes. Each special exercise was repeated 4-6 times, at a slow pace. The volume of swimming for one session was 150-300 meters.

The second period had additional exercises with resistance and weights, therapeutic swimming was conducted with swimming fins. The session took 40-45 minutes. Special exercises were repeated 6-10 times, at an average pace. The volume of swimming for one session was 300-500 meters.

The stabilizing period was complicated by the use of special paddles during therapeutic swimming when performing rowing movements with the arms, increasing the amplitude of the performed movements. Due to the increase in the total and motor density of the session, its duration was reduced to 35-40 minutes, with 6-8 times repetition of special exercises, at a medium pace. The volume of swimming for one session using special equipment for upper and lower limbs was reduced from 200 to 400 meters.

The results obtained were statistically processed with the Statistica 13 software. We calculated the arithmetic mean ($\bar{X}$) and standard deviation (σ), the reliability of differences between the indices before and after the study was determined using the Wilcoxon signed-rank test ($p < 0.05$).

Results and discussion. The effects of hydrokinesiotherapy for 18-20 year olds with obesity were evaluated according to the dynamics of the studied indices (tables 1, 2).

We obtained significant results ($p < 0.05$) reflecting reduction of body mass by 21.7%, from 99.0 ± 5.0 to 77.5 ± 2.5 kg and BMI by 27%, from 37.0 ± 2.2 to 27.0 ± 1.3 kg/m². Waist and hip girth reduced by 25.8% and 27% respectively (table 1).

During the course of hydrokinesiotherapy, the function of cardiorespiratory system improved ($p < 0.05$) (table 2). Respiratory test indices also improved: respiration test on inhale – by 83%, respiration test on exhale – by 80% of the initial values. The Ruffier test's index improved by 29%, which together testifies to the increase of functional capabilities and expansion of adaptive potential of the studied group when applying means and forms of hydrokinesiotherapy (table 2).

Table 1

Changes in anthropometric indices of the studied group, $\bar{X} \pm \sigma$

Study stages	Body mass, kg	Waist girth, cm	Hip girth, cm	BMI, kg/m ²
Initial	99.0 ± 5.0	103.0 ± 4.0	91.0 ± 3.5	37.0 ± 2.2
Final	77.5 ± 2.5	79.0 ± 2.5	80.5 ± 1.5	27.0 ± 1.3
P<	0.05	0.05	0.05	0.05

Note: BMI – body mass index

Table 2

Changes in the cardiorespiratory system function of the studied group, $\bar{X} \pm \sigma$

Study stages	Respiration test on inhale, s	Respiration test on exhale, s	Ruffier test, points
Initial	30.0 ± 5.0	22.5 ± 2.5	18.5 ± 2.0
Final	55.0 ± 5.0	40.0 ± 2.5	13.0 ± 1.5
P<	0.05	0.05	0.05

We found a significant ($p < 0.05$) increase in arm strength endurance evaluated by the 30 s push-up test from 6.0 ± 0.3 to 15.0 ± 0.4 reps ($p < 0.05$). Leg strength endurance evaluated in 30 s squats increased from 13.0 ± 0.5 to 23.0 ± 2.0 reps ($p < 0.05$). The results indicate an improvement in physical status of obese 18-20 year old patients as an outcome of the hydrokinesiotherapy course.

Conclusion. Use of hydrokinesiotherapy for obese 18-20 years old patients contributed to the substantial body mass loss by 21.7% and

BMI by 27%, reduction of waist girth by 23.3% and hip girth by 25.8%. Results of the respiration test on inhale improved by 83%, results of the respiration test on exhale – by 80%, the Ruffier test – by 29%. Arm strength endurance increased by 150%, leg strength endurance – by 76.9%. The results obtained convincingly demonstrate the positive effects of hydrokinesiotherapy in 18-20 year old patients with obesity, improving their physical and functional status.

Conflict of interest. The authors declare no conflict of interest.

REFERENCES

1. Vagin V.A., Koroteeva V.V. Incidence of metabolic syndrome among the working population of the Sakhalin region. *Clinical gerontology*, 2010, vol. 16, no. 9-10, pp. 15-16. (in Russ.)
2. Dedov I.I., Mel'nichenko G.A., Shestakova M.V., Troshina E.A., Mazurina N.V., Shestakova E.A., Yashkov Yu.I., Neimark A.E., Biryukova E.V., Bondarenko I.Z. et al. Russian national clinical recommendations for morbid obesity treatment in adults. 3rd revision (Morbid obesity treatment in adults). *Obesity and metabolism*, 2018, vol. 15, no. 1, pp. 53-70. (in Russ.)
3. Gerasimova A.S., Olejnikov V.E. Drug correction of arterial hypertension associated with metabolic syndrome. *Proceedings of universities. Volga region. Medical Sciences*, 2010, no. 1, pp. 106-119. (in Russ.)
4. Corbeil P., Simoneau M., Rancourt D., Tremblay A., Teasdale N. Increased risk for falling associated with obesity: mathematical modeling of postural control. *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, 2001, vol. 9, no. 2, pp. 126-136.
5. Heo M., Faith M.S., Pietrobelli A., Heymsfield S.B. Percentage of body fat cutoffs by sex, age, and race-ethnicity in the US adult population from NHANES 1999-2004. *The American Journal of Clinical Nutrition*, 2012, no. 95, pp. 594-602.
6. Alekseeva N.S. Influence of components of metabolic syndrome on the patients' life quality. *Acta Biomedica Scientifica*, 2014, vol. 6, no. 100, pp. 9-13.
7. Batsis J.A., Villareal D.T. Sarcopenic obesity in older adults: aetiology, epidemiology and treatment strategies. *Nature Reviews Endocrinology*, 2018, vol. 14, no. 9, pp. 513-537.
8. Janssen P. Training at anaerobic threshold. Lactate threshold training, 2nd ed. *United States: Human Kinetics*, 2001, no. 4, pp. 25-41.
9. Lunina N.V., Zemskaya S.M. Morphofunctional features of 30-40 years old men with obesity at the initial stage of health and fitness classes in the fitness center. *Russian Journal of Sports Science: Medicine, Physiology, Training*, 2023, vol. 2, no. 3. DOI: 10.51871/2782-6570_2023_02_03_5.
10. Kurshakov A.A., Sajfutdinov R.G., Anchikova L.I., Valeeva I.Kh., Nikishova T.V. Insulin resistance and endothelial dysfunction in metabolic syndrome. *Kazan Medical Journal*, 2011, no. 2, pp. 28-35. (in Russ.)
11. Jin C.H., Rhyu H.S., Kim J.Y. The effects of combined aerobic and resistance training on inflammatory markers in obese men. *Journal of Exercise Rehabilitation*, 2018, vol. 14, no. 4, pp. 660-665.
12. Osadchaya E.K., Lunina N.V. Efficacy of hydrokinesiotherapy in infant children with muscle hypotension syndrome. *Russian Journal of Sports Science: Medicine, Physiology, Training*, 2022, vol. 1, no. 3. DOI: 10.51871/2782-6570_2022_01_03_6.
13. Sobchuk I.V., Lunina N.V. Hydrokinetic therapy in the comprehensive rehabilitation of basketball players after arthroscopic surgeries for treating meniscus injury. *Russian Journal of Sports Science: Medicine, Physiology, Training*, 2022, vol. 1, no. 4. DOI: 10.51871/2782-6570_2022_01_04_6.

INFORMATION ABOUT THE AUTHORS:

Natal'ya Vladimirovna Lunina – Candidate of Biological Sciences, Associate Professor, Associate Professor of the Department of Physical Rehabilitation, Massage and Health-Improving Physical Culture named after I.M. Sarkizov-Serazini, Russian University of Sports “GTSOLIFK”, Moscow; Senior Researcher of the Center for Biomedical Technologies, FSBI “North-Caucasian Federal Research and Clinical Center of Federal Medical and Biological Agency”, Essentuki, e-mail: natalya-franc@mail.ru.
Aleksandra Aleksandrovna Pustokhina – Bachelor of the Department of Physical Rehabilitation, Massage and Health-Improving Physical Culture named after I.M. Sarkizov-Serazini, Russian University of Sports “GTSOLIFK”, Moscow.

For citation: Lunina N.V., Pustokhina A.A. Effects of hydrokinesiotherapy in 18-20 years old patients with obesity. *Russian Journal of Sports Science: Medicine, Physiology, Training*, 2023, vol. 2, no. 4. DOI: 10.24412/2782-6570-2023_02_04_5