BALNEO RESEARCH Balneo and PRM Research Journal
English Edition
e ISSN 2734 - 8458 p ISSN 2734 - 844X ROMANIAN ASSOCIATION OF BALNEOLOGY

Prospective study

Evaluation of Kangoo Jumps rebound exercise program: A prospective study of a general population

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Citation: Russu O.M., Pop T.S., Feier A.M, Iova A., Farcaș D.M., Burta O.L., Borodi P.-G., Sebestyen K. - Evaluation of Kangoo Jumps rebound exercise program: A prospective study of a general population *Balneo and PRM Research Journal* **2022**, *13(3): 511*

Academic Editor(s): Constantin Munteanu

Received: 01.07.2022
Accepted: 20.08.2022
Published: 01.09.2022

Reviewers: Gabriela Dogaru, Mariana Rotariu

Publisher's Note: Balneo and PRM Research Journal stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Abstract: Introduction. The number of non-communicable diseases (NCDs) is in a constant rise, especially in the low and middle income countries. They could be highly prevented by implementing programs that will help in promoting health and changing harmful behaviors. The aim of this paper is to show that Rebound exercisesis a great example of such physical activity. **Material and method.** The study plan was designed to asses both physical and functional explorations, ultrasound scans, self-perception of body image and laboratory parameters for each patient. A total of 64 parameters were analyzed: 44 anthropometric parameters and 20 body composition parameters from 80 participants. The subjects were analyzed for a period of 6 months. **Results and discussions.** Parameters were analyzed at the beginning of the study (07.02.2019), after 3 months (25.05.2019) and at the end (26.09.2019). The results showed improvements in all utilized parameters. **Conclusions.** This study offers a novel perspective on Kangoo jumps practice. People with spine problems, diabetes, overweight levels, improved their health, got rid of back pain, lost weight and had a more toned body.

Keywords: *physical activity, overweight, harmful behaviors, non-communicable diseases*

1. Introduction

The number of non-communicable diseases (NCDs) is in a constant rise, especially in the low and middle-income countries. According to World Health Organization, the 36 million deaths that occurred during 2008, were due to NCDs, mainly cardiovascular diseases, diabetes, cancer and chronic respiratory diseases. Osteoarthritis is also a very prevalent NCD, being the most encountered rheumatic disease in the general population (1,2,17). Such diseases could be highly prevented by implementing programs that will help in changing of a few harmful behaviors, such as: inactivity or low physical activity, poor nutrition, smoking and high alcohol intake (3).

The harmful behavior changes increases the NCDs risk. By simply informing people about the negative effects of their risk factors to their health is proven to be an ineffective method. (4)

Studies have shown that good cognitive-behavior changes in adults and young people can be successfully achieved by adopting physically active lifestyles. They also support the idea that physical activity, smoking cessation and non-harmful alcohol consumption

are associated with better cognitive performances and half as likely to be depressed and anxious based on Beck Anxiety Inventory (BAI), Beck Depression Inventory (BDI) and The Cambridge Cognitive Test (CAMCOG). On the strength of the well known positive effects of sports activities, several programs have been introduced. These help people involving in physical activity in order to promote health, losing weight and improving motor abilities during childhood. (5,19,20)

Physiotherapy have also an important role in the prevention of lifestyle-related diseases by enhancing musculoskeletal function, reducing BMI, and improving general health (18). Regular physical exercise improves the antioxidant defense system and protects against exercise-induced free radical damage. This shows how well adapted the body is to the demands of exercise. Studies that have been done on this topic, show that medium-intensity exercises increase NO production and this can lead to a long term protective effect on cardiovascular system. With the release of NO, elasticity of veins increases and inhibits the growth and development of atherosclerosis in the endothelium. (6, 20)

A medium-intensity activity makes 70% to about 85% maximum heart rate. A popular example of such activity is rebound exercises. Electromyography and kinematics studies show rebound exercises works effectively the vastus lateralis, biceps femoralis and lateral gastrocnemius. Being an aerobic type of exercise it also helps in "burning" fat. Laser photoacoustic spectroscopy (LAPS) is a technology that measures the breath ethylene, a by-product of free radicals that can be directly correlated to physiological events in the patients. Determinations during rebound exercises suggest that this practice is efficient in reducing the oxidative stress. (7,8,22,23)

The goal of the present article is to prove the effectiveness of the rebound exercises in improving the general health of patients and changing their harmful behaviors.

2. Material and Methods

The study plan was designed in an original, staged and extremely complex manner, following the assessment of both physical and functional explorations, ultrasound scans, self-perception of body image and laboratory parameters for each patient.

Of the total of 350 people who responded to the initiative, 173 were pre-registered, of which, 80 people were admitted and grouped into 4 categories: overweight, diabetics, with osteoarticular disorders and healthy people, who began rehabilitation/recovery and maintenance sessions, following specific programs.

The program began with assessments of the initial condition of the 80 people involved in the study. They underwent anthropometric analyzes of body composition, Tanita measurements by bioelectrical impedance analysis (BIA) method of adipose and muscle tissue on body segments, intra and extracellular hydration levels, visceral fat indicators, metabolism rate baseline, assessment of daily caloric requirement for weight loss or maintaining current parameters, bone mineralization indicator, Hosand scanning of adipose and muscle tissue, ultrasound of muscle tissue, calipermetry, body posture assessments, foot statics and footprint assessments, blood tests (total blood count, biochemistry and hormonal parameters), psychological tests.

A total of 64 parameters were analyzed: 44 anthropometric parameters and 20 body composition parameters.

The subjects were analyzed for a period of 6 months. Parameters were analyzed at the beginning of the study after 3 months and at the end of the 6 months period.

The subjects engaged to three workouts per week for about 6 months. The training program began with three to five minutes of warm-up. The main part consisted in three levels of difficulty depending on the degree of endurance of each participant for 35 to 40 minutes.

The first level consisted in static exercises, without jumps, toning with or without adapted weights, jogs, march and step touch. In the second level the subjects performed light jumps like side leg, front kick, back kick, slalom and aerobic steps like grapevine moves, 45% knee lifting and leg curls. The third and the last level was reserved for the most advanced participants. The exercises comprised jumps with 90% front, side and back lifts, jumping jacks and hops.

For the participants with knee pain, the exercises were also adapted to their level of knees functionality. The most important thing is to use patented/original boots, suitable to their weight. When the participant was overweight, the first attempt was to lose weight. We recommend diets and three to five level one workouts per week for a month. Level two workouts can be used depending on how many kilograms need to be lost. If the participant had a normal body weight, the bow of the boots was adjusted based on the diagnosis (meniscus injuries, knee osteoarthritis, recovery after meniscus or cruciate ligaments surgery or tendinitis). Exercises on one limb were avoided.

Every session ended with 10 minutes of relaxation and stretching movements in order to release the stress and tension of the muscles and to boost the flexibility of the joints.

3. Results

The parameters that were analyzed at the beginning of the study (07.02.2019), after 3 months (25.05.2019) and at the end (26.09.2019) are listed in the two tables (Table 1, Table 2).

Among the results, the metabolic age decreased in all study participants, between 3 and 21 years. The average metabolic age decreased by 16.4 years.

Another results also indicated that visceral fat decreased in all study participants from -2 to -6 (on the scale from 1-60, in which 12 is the health limit of visceral fat). 47% had exceeded this limit and only 5% were over.

The results also show that body hydration improved in all study participants by 8% up to - 17% and at the end of the study, all participants tested had a hydration level between 50-55%.

Also, the exercises on boots improved the lymphatic drainage from the lower limbs to all participants, which was observable on the size of the limbs in the area of the knee, ankles, calves and objectified on ultrasound scans. No longer the participants accused swelling of the feet after a busy day.

All participants had a height increase between 1 and 1,5 cm (the maximum being in case of a female participant, 45 years old, about 3 cm).

Spinal static problems were greatly improved and musculoskeletal joint pain was no longer mentioned at the final consultation.

4. Discussion and conclusions

In the present article, we investigated whether the practice of rebound exercises help for improving general health. The results showed improvements in all utilized parameters.

To start with, the metabolic age is associated with impaired glucose handling, mainly due to a decline in insulin action. An age related increase in body mass index might be an additional factor favouring a decline in insulin sensitivity. The official age is just a marker on the calendar. Age-remodelling is a very important process as it enables a re-setting of body function in relation to advancing age. Lifestyle and a genetic background that is potentially protective against age related metabolic derangement can contribute to a successfully metabolic age remodelling. (9,10).

As we suggested before, the metabolic age is reversible, unlike the conventional one. It depends on the level of activity performed daily and nutritional habits, not just genetic inheritance. Our study shows a great lowering in the metabolic age with a mean decrease of 16.4 age, after rebound exercises.

The visceral fat, is the adipose tissue located in the abdominal area. It is extremely dangerous, being associated with cardiovascular disease, type 2 diabetes and more. In recent years it is known that fat deposits in the abdominal area are the most harmful to health. The adipose tissue in the abdominal cavity covers some of the vital organs – the stomach, liver and intestines. Visceral fat can turn into cholesterol, and thus increasing the risk of atherosclerosis (11,12). The study concluded that the exercises on boots reduces the visceral fat.

About 60% of our body weight is water. As we exert ourselves, this fluid is lost through the skin in the form of sweat and through the lungs. If water is not replaced at regular intervals, before, during and after physical activity, dehydration may occur (13,14). Body hydration improved in all study participants showing that practicing rebound exercises, is a useful educational measure in the process of hydrating style.

Also, by rebalancing the posture and by hydrating the intervertebral discs, all participants had a height gain between 1 and 1,5 cm (maximum 3 cm).

Our study converges with previous findings (15). In addition to the proven benefits on subjects fitness and strength, our study also shows the benefits in matter of fat percentage loss and muscle gain.

Contrary to the findings by T. Mokrova et al. 2018, our findings indicated significant changes in the average body weight of the participants (16).

Our findings offer a novel perspective regarding the sports of jumping on rebound boots. The intention of the "KAPO Health on boots is to set up in Oradea a Pilot Center "KAPO – health on boots", unique in South-Eastern Europe, with the launch of a set of training, rehabilitation and recovery programs on rebound boots for hospitals, schools, kindergartens, rehabilitation centers and fitness rooms.

As for future work, more research is needed to investigate the use of rebound boots due to lack of previous research studies on the topic. As was stated before, there were some differences between our study and others about body weight changes. Further investigations, would help final these aspects.

Our study showed great benefits in terms of physical health. Future studies could seek if there are any benefits in the treatment of mental conditions, such as depression.

Being taken together, the results of this study offer a novel perspective about rebound practice. People with spine problems, diabetes, overweight levels, improved their health, got rid of back pain, lost weight, had a more toned body, they even got taller with 1-2 cm thanks to the posture correction.

Declaration of conflict of interests

There is no conflict of interest for any of the authors regarding this paper.

Informed consent

The investigated subjects were informed about the purpose and methodology of the study presented here, expressing their agreement to the processing and publication of the results.

Acknowledgments

Noting to declare.

Table 1. Results.

Date of measurement	**07.02.2019**	**25.05.2019**	**26.09.2019**
Height (cm)	165	165	165.5
Weight (kg)	68	65.9	63.5
Adipose tissue (TANITA) (%)	28.6	26.5	24.2
Muscular tissue (kg)	46.1	46.3	48.4
Bone mass (kg)	2.5	2.6	2.6
BMI	25	24.1	23
DCI (kcal)	2219	2067	2489
Metabolic age	47	42	38
Hydration level (%)	52.5	53.2	54.7
Visceral fat (1-59 units)	7	6	4
Right arm fat (%)	27.9	26.1	22.7
Left arm fat (%)	26.9	26.2	22.6
Right inferior member fat (%)	37	28.2	26
Left inferior member fat (%)	38	28.1	26.4
Right arm muscle mass (kg)	26.8	24.8	21.6
Left arm muscle mass (kg)	2.4	2.6	2.8
Right inferior member muscle mass (kg)	2.4	2.7	2.8
Left inferior member muscle mass (kg)	7.1	7.7	8.7
Trunk muscle mass (kg)	7	7.8	8.6
Trunk fat (%)	22.7	24.9	26
Adipose tissue (OMRON) (%)	34	32	28.2
Waist size (cm)	77.5	75	74
Abdomen size (cm)	92.5	81	79
Glutes size (cm)	102	99	96
Superior thigh size (cm)	60	57	55
Middle thigh size (cm)	50.5	50	48
Inferior thigh size (cm)	41	39	38
Calf size (cm)	34.5	33	32
Arm size (cm)	28	27	27
Neck size (cm)	33	32	32
Shoulders size (cm)	107	102	100
Torso size (cm)	94	89	88

BMI – Body mass index, DCI – Daily calorie intake

Table 2. Calipermetry.

Calipermetry (mm)			
Upper abdomen (vertical)	14	10	2
Lower abdomen (vertical)	14	10	2
Suprailiac (diagonal)	16	11	6
Medioaxillary (horizontally)	12	6	2
Anterior axilla (diagonal)	9	7	2
Subscapular (diagonal)	12	8	2
Back (horizontally)	24	18	10
Thigh (vertical)	24	10	8
Calf (vertical)	12	8	4
Biceps (vertical)	4	2	2
Triceps (vertical)	8	4	2
Inner thigh (vertical)	10	6	4
Subgluteal (oblique)	28	22	16

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