



Gym fitness equipment to build motor abilities in man

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PhD, Associate Professor **Yu.M. Kabanov**¹

Associate Professor **Yu.V. Nedosekov**¹

PhD, Associate Professor **P.K. Gulidin**²

PhD, Associate Professor, Doctoral Student **D.A. Venskovich**³

V.A. Koloshkina²

¹Vitebsk Order «Badge of Honor» State Academy of Veterinary Medicine, Vitebsk, Republic of Belarus

²Vitebsk State University named after P.M. Masherov, Vitebsk, Republic of Belarus

³Belarusian State University of Physical Culture, Minsk, Republic of Belarus

Corresponding author: Venskovich.Dina@mail.ru

Abstract

Objective of the study was to develop and excel gym fitness equipment for physical progress and rehabilitation needs.

Methods and structure of the study. The gym fitness equipment development process was organized to (1) design and test fundamentally new gym fitness equipment; and (2) excel the existing fitness equipment.

Results and conclusion. The gym fitness/ rehabilitation equipment of our design analyzed herein was designed to build and improve strength, speed-strength and movement coordination qualities on an individualized basis, with some trainers applicable for specific rehabilitation purposes. The hand grip, for instance, may be used for the post-injury rehabilitation of the relevant hand muscles, ligaments and tendons; the gymnastic bench may be used to recover and excel the walking movement coordination; and the gymnastic ladder to correct a range of postural and spinal disorders/dysfunctions. We have also developed an ankle joint muscle rehabilitation and training machine. Every piece of the gym equipment of our design can be easily produced using the standard industrial equipment and readily accessible materials.

Keywords: *physical development, gym fitness equipment, motor abilities, ankle joint trainer, gymnastic bench, tennis trainer, gymnastic ladder.*

Background. Nowadays physical progress needs are largely facilitated by modern technologies geared to fully mobilize the inherent biological resource using modern gym fitness equipment for application in the physical education and training systems for physical progress, rehabilitation, health and motor skills excellence purposes [1, 2, 7]. The gym fitness equipment design process claims great creative resource since the modern fitness industry is well supplied with training machines to facilitate selective training of every key muscle group.

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Results and discussion. We give herein overviews of the following new gym fitness equipment: hand grip, gymnastic bench; tennis trainer, gymnastic ladder, and ankle joint trainer for the joint flexibility, rehabilitation and training purposes. Every piece of the above fitness equipment is designed for focused training of specific physical qualities (strength, speed-strength, coordination, etc.) and, in some cases, for physical therapeutic/ rehabilitation service.

Hand grip [3]. The device may be described as a set of rings with attached springs, with the larger ring fixed on the thumb, whilst four sequential springs on



the other rings fixed on distal phalanges of the other fingers. Diameter of the rings is customized to the sizes of the fingers. The springs create a workload on the finger extensor muscles and go back to the prime position when the fingers are flexed. The hand grip design is simple enough and effective for training the hand muscles and joints, easy in operation and for industrial production. The hand grip may be beneficial for the post-injury and post-surgery rehabilitation purposes as it may be customized to train specific hand/ forearm extensor muscles, ligaments and tendons. It may be also recommended for rehabilitation of impaired cerebral circulation with dysfunctions of peripheral nerves in the upper limbs, for training paretic and weakened muscles so as to restore fine differentiated movements in the affected limbs.

Gymnastic bench [4]. Gymnastic bench may be helpful for safe movement coordination training in the seat-up and seat-down positions, in contrast to a traditional static gymnastic bench that may not be customized and, hence, not always beneficial enough. This was the reason for us to offer a new gymnastic bench design more efficient for the movement coordination training missions. The new gymnastic bench elements are equipped with steel rods and beam with bearings so that the beam swings horizontally when the bearings roll inside the U-shaped grooves in the legs to the limiters of the beam rotation angle. For the training process efficiency in the seat-down position, the beam is movable horizontally due to its steel rods sliding and rotating in the leg grooves. The trainee's movements are facilitated by the beam easily rocking in the grooves on the bearings, with the beam rotation angle adjustable by the limiters.

Movement coordination is trained using the gymnastic bench as follows. The gymnastic bench may be fixed in the seat-up or seat-down position depending on the difficulty level required for training. The seat-down position is considered more difficult and effective. The varied trainee's pressure on the seat is responded by the beam rocking horizontally, whilst the trainee strives to maintain equilibrium and thereby trains the movement coordination. The beam rotation angle may be customized to the individual fitness or training goal by adjusting the rotation angle limiters. The new gymnastic bench may be easily produced using a standard set of industrial machinery and accessible materials.

Tennis trainer [5]. Tennis trainer is the standard gym equipment for training table tennis attacks to a designated zone on the table. Our goal in the tennis trainer design was to facilitate the zone attack skills training process by separating one part of the table from the other, with the target section being quarter-size of the standard and movable. This movable target section will be fixed in whatever zone to train the specific attack skill. The tennis trainer facilitates trainings of the attack accuracy, response speed and versatility; and was tested to fast improve the individual tennis trainer techniques and tactics, with special benefits for the training process effectiveness on the whole.

Gymnastic ladder [6]. Gymnastic ladder is the gym fitness/ medical equipment formally ranked with the muscle training and spine dysfunction/ disorder correction systems applicable to gym trainings, physical therapy and other physical education and sports missions. Our goal was to redesign a standard gymnastic ladder to facilitate trainings of specific muscle groups and correct spinal dysfunctions/ disorders. The new gymnastic ladder design offers movable crossbars that slide in the vertical grooves and may be stopped in the required position by lockers in the vertical uprights. Positions of the horizontal crossbars may be adjusted as required for the training efficiency. Training service will be prudently customized to train the key muscles and correct spinal disorders with a special sensitivity to the individual anthropometrics. The trainee will start in suspended position on the gymnastic ladder with the back to the gymnastic ladder and the arms fixed on the upper crossbar. The upper crossbars will be adjusted to the individual spinal profile and/ or as required by the spinal malfunction correction protocol. The training service will prudently combine the static and dynamic exercises as required by the spinal function rehabilitation and postural disorder correction purposes. The new gymnastic ladder may be easily made of wood and steel bars.

Conclusion. The gym fitness/ rehabilitation equipment of our design analyzed herein was designed to build and improve strength, speed-strength and movement coordination qualities on an individualized basis, with some trainers applicable for specific rehabilitation purposes. The hand grip, for instance, may be used for the post-injury rehabilitation of the relevant hand muscles, ligaments and tendons; the gymnastic bench may be used to



recover and excel the walking movement coordination; and the gymnastic ladder to correct a range of postural and spinal disorders/ dysfunctions. We have also developed an ankle joint muscle rehabilitation and training machine. Every piece of the gym equipment of our design can be easily produced using the standard industrial equipment and readily accessible materials.

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