

## ABSTRACT

**Presumptions and aim of the study:** According to WHO falls are second most common reason of random, unintentional death – right after traffic accidents. In Poland, only suicides are more common reason of death. Population of individuals, who will spend rest of their lives being disabled because of a fall is becoming substantial global problem of public health. Main aim of the study was knowledge about effects of education of physiotherapy students, as future specialists capable of teaching safe fall for people with vision defects and limbs amputees.

**Hypothesis:** (1) high susceptibility of body injuries during a fall, low physical fitness level, vision defects or limb amputation is not substantial factor that will limit ability to learn safe fall solutions (techniques) on high level in different circumstances; (2) complementary motor education in safe falling and collision avoidance (including supportive exercises for this skills) is stimulating development of those category of motor competences as well as increment of tolerance level to balance disturbances, muscle strength and flexibility; (3) around half of the students will met motor, methodological and mental criteria of physiotherapy specialist after finishing two special courses and with consideration of other education effects. Those students will be capable of teaching safe falls to people with vision defects and/or with limb amputation; (4) the biggest capital of effective prevention of fall results for healthy individuals as well as people with vision defects and/or with limb amputation relates to potential possibility of learning previously unknown motor skills (safe falls techniques). Direct proof of that is similarity of adaptation effects for healthy individuals as well as people with vision defects and/or with limb amputation after identical health training period based on the same exercise methods.

**Material:** There were 177 physiotherapy students and 14 disabled people tested (clinical trials). First stage of randomized pilot study includes 133 physiotherapy students, from which results of 90 (68 women and 22 men) was considered. The second stage of main study 62 students were observed and 44 results were considered (30 women and 14 men). On the third stage of clinical studies there was observation of: 6 patients with vision defects, 2 people with upper limb amputation, 6 patients with underdevelopment or after amputation of lower limb. Apart from that, results of female study with III level of obesity were analyzed.

**Methods:** Motor effects were based on results of: the test of safe falls (TSF) and modified test of safe falls (TSF-M4); the susceptibility test of the body injuries during the fall (STBIDF); rotational test (RT); 3 trials of strength and flexibility (the International Test of Physical Fitness (ITPF)). Methodical effects were based on knowledge tests from: kinesiology; theories and methods of health training; theories and methods of safe fall. Mental effects were based on diagnostic survey: the meaning of teaching safe fall (MOTSF); self-evaluation of motor and methodical competences (SMMC).

**Results:** (1) Expected adaptive effect (optimal protection while hitting the ground due to balance loss and fall) for normal intelligence adult patient with vision defects, patients with limb amputations, people with severe obesity, so especially for people not qualified to any group of higher risks were achieved after 10 therapeutic or health training sessions. (2) Optimal stimuli are a content of 40 minutes' session as compilation of formal safe fall exercises, collision avoidance, collisions with vertical objects and objects in motion. This should relate to motor simulations adjusted to individual predispositions from this category of scenarios alongside with fun forms of martial arts. There is requirement of similarity of indicators for continuous physical workload with changing intensity (time of specific exercises, intensity, number of repetitions of key simulations etc.). (3) Arrangement of 10 kinesiotherapy or health training sessions (fulfilling forgoing criteria), independently form radical reduction or body control error during a backward fall or mastery of professional falls on at least high level, have great influence on tolerating balance disturbances. Muscle strength and flexibility is stabilized on sufficient level for effective body control during a fall and immediate going back to vertical posture. (4) Hypothesis were verified positively, but second hypothesis were verified partially, because applied stimuli did not increase muscle strength nor flexibility.

**Cognitive and application conclusions:** 1) In circumstances when fall is inevitable, trained man can use adequate, professional motor response based on techniques recommended especially by judo, where key part is use of upper limb amortizing functions. Second strategy is based on protecting distant parts of the body by hitting the ground with large body parts connected with tumbling effect on soft body parts, extending a distance and time of collision, which allows to disperse warpage energy effectively (optimal, verified technique is called "cradle"). 2) Motor relatedness of STBIDF with TSF and TSF-M4 revealed by close agglomeration of STBIDF's indicators with time of execution of TSF or TSF-M4 substantiate further modification of those diagnostic tools to increase its differential power, which will make them more valid and reliable. 3) State institutions, which are responsible for education of human resources for public health sector and those with close relation to them (physical education) alongside with those responsible for health prophylactic should undertake coordinate actions to implement those unique (developed by polish scientists and practitioners) programs of prevention of fall results and collisions based on mainstream safe fall teaching. 4) Spreading results of this dissertation may increase awareness of public opinion, and induce revision of naïve paradigm of fall prevention by its elimination (which is clearly ridiculous), and assuming rational argumentation, that limiting falls occurrence by positively verified interventions could effectively fulfill but never replace still underappreciated core of this yet-to-be real global system of prevention based on common teaching of safe falls and collision avoidance.