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ORIGINAL PAPERS

Monika Piątkowska

Age-related changes in physical activity patterns in Poland

Introduction. The beneficial influence of physical activity on human's health and well-being remains unquestionable. The epidemiologic studies carried out all over the world show that sedentary lifestyle contributes to numerous chronic diseases and conditions. The aim of the study was to assess the physical activity level of the Polish society and to examine age-related differences of total energetic expenditure of Polish adults aged over 15 years old.

Material and methods. A CAPI survey was carried out the random representative sample of the Polish population ($n = 1028$). A questionnaire deriving from Eurobarometer 183-6/58.2 Physical Activity was applied in the study. The questionnaire consisted of a short version of the International Physical Activity Questionnaire (IPAQ) and questions concerning the context of physical activity and perception of environmental opportunities for physical activity.

Results. According to IPAQ methodology 27.9% of the subjects were insufficiently active, 32.3% moderately active and 33.5% were highly active. The median scores of total energetic expenditure amounted to $\bar{x} = 2331.26 (\pm 2159.43)$ MET min/week. Age was weakly correlated with physical activity (PA) level ($r = -0.141$; $p < 0.001$). A strong relationship between these variables was found in the parabola of form $PA = \text{Age} \cdot 104,386 - \text{Age}^2 \cdot 1.3325 + 695.853$ ($R^2 = 0.054$) with a maximum at the age of 33–43.

Conclusions. The PA level of the Polish society is not as low as it has been shown in numerous studies. Age seems to be a strong determinant of PA level. The non-linear relationship between total physical activity and age has been observed. Age is correlated with the intensity of recreational physical activity; the older we get the less intensively we participate in physical activity in free time.

Key words: physical activity level, IPAQ, age groups

Joanna Gradek, Edward Mleczek, Józef Bergier, Wacław Mirek, Konrad Rembiasz, Agnieszka Płatek

Running training in women and men aged 25 or older and physical fitness factors in accordance with the health-related fitness concept

Aim of the study. The study was designed to evaluate adaptative effects of 16-month original running training program on physical fitness components considered in accordance with the health-related fitness concept (H-RF) in the late middle-aged and elderly subjects of both genders.

Material. In the study, conducted in June 2010 and in November 2011, 21 women and 42 men were involved. The average age of women was 36.1 ± 9.0 and of men 43.9 ± 9.6 . The subjects took part in the endurance running training sessions regularly 2–6 times per week.

Methods. The evaluation was carried out with the help of direct observation employed to assess participants' physical fitness level in terms of H-RF on the basis of their performance in selected trials taken from the battery of tests *Eurofit for Adults*. Diagnostic survey was based upon thorough analyses of documents and interviews. The obtained findings were statistically verified by means of dependent t-test for paired samples and described in accordance with Pearson correlation method.

Results. During the 16-month training cycle only in women the extensive increase in training load was found. No favorable changes in morphological components were discovered. However, there was a positive effect of training in men and women on other components of health-related physical fitness (H-RF). The analysis of the strength of relationship between training load, age seniority and sports performance (M-PF), and physical fitness assessed in conditions of health-related fitness allows us to assume that important independent variables are age and training volume.

Conclusions. In order to obtain adaptative changes, particularly in women, it would be necessary to intensify their endurance training. However, the important thing is the relevance of age and training for participants, especially the older ones. In that case sport aims must be designed adequately to functional capacity of human aging organisms.

Key words: running training, women, men, 25–56 years of age, physical fitness in accordance with the H-RF concept

Kamil Sławecki

Physical activity of men assessed through the use of International Physical Activity Questionnaire – Long Version

Aim of the study. The study was aimed at measuring the diversification in physical activity level of researched men in four important for human life areas: professional activity, active transport, housework and leisure time in accordance with the age and educational backgrounds of participants.

Material and methods. The research sample consisted of 113 healthy men, employed in an industrial plant in the Lesser Poland, aged 20–49 years. As a research tool served long version of International Physical Activity Questionnaire (International Physical Activity Questionnaire – IPAQ). For the purposes of this study physical exertion in MET-min per week was determined in accordance with the subjects' affiliation to one of three age groups: 20–29, 30–39 and 40–49 years of age, and their educational backgrounds. On the basis of obtained results the participants were assigned to one of three categories due to the level of physical activity (high, moderate and insufficient) they went in for.

Results. MET-min per week values calculated for the level of physical activity in four above-mentioned areas statistically significantly differentiated ($p < 0.05$) the participants in three examined age groups. Men at the age of 30–39 were most active in the sphere of professional work. In this area men at the age of 20–29 were the least active. However the opposite direction of diversification was observed in leisure time. Men at 20–29 years of age took physical activity connected with the item: recreation and sport most willingly, and the least active in this field were the participants grouped in the age brackets of 30–39 years.

Considered from the educational perspective, the values we obtained in MET-min per week have revealed that holders of secondary vocational qualifications were most active in the area of professional activity however the lowest MET values in this field were observed in the group of university degree holders. In two items: migration and housework statistical differences between the participants concerning their age and education level practically did not occur.

Conclusions. Age and educational backgrounds of participants significantly differentiated the level of physical activity associated with work and leisure time.

In general, the importance of broadly considered physical activity in areas such as professional work, active migration and housework should be stressed. Further analyses of this problem can deliver more detailed information, helping to expand the existing scope of knowledge about the influence that physical activity as such exerts on important areas of human lifestyle.

Key words: men, physical activity, IPAQ, age, educational background

Stanisław Gołąb, Agnieszka Woronkiewicz, Jan Sobiecki

Evaluation of the usefulness of method for determining body fat in men in the light of the relationship with the physical performance and endurance fitness

Introduction. In research on physical anthropology as major components of health are taken into account physique (body composition) as well as fitness and physical efficiency. Excess body fat has clear links with health risks, lower productivity and physical performance.

Aim of the study. Assessing the usefulness of methods for determining body fat in research on physical condition of adult males. As a criterion for suitability of the above research method for studies, conducted on larger groups of subjects, we employed the relationship level between the measures of fatness and the functional efficiency of physical performance.

Material and methods. The results of anthropometric and fitness tests, carried out on about 1400 male industrial workers aged 20–70, were examined with four methods of assessing body fat: 1) relative fatness index [(sum of 4 folds / body weight) \times 100]; 2) BF% in body composition according to the Body Composition Analyzer (Tanita); 3) BF% by Siri equations (D – according to Durnin, Womersley); 4) BF% from BMI by Deurenberg.

Fitness variables measurement consisted of five trials taken out of the Eurofit test: motor balance, plate tapping, sit and reach, standing board jump and hand grip strength. Physical capacity test was designed in accordance with the YMCA step-test and the %HRmax. The relationship between the measures of fatness, fitness and physical performance was determined by linear correlation.

Results and conclusions. Most significant correlation occurred among the participants aged 30–39. Two measurements of body fat – by Tanita BF% and the index of relative fatness – were most correlated with the efficiency, having been characterized by the highest intragroup variability. The level of body fat determined by these methods can be considered as a particularly accurate measure of physical fitness in the diagnosis of men.

Key words: body fatness measure, physical fitness, men

Ewa Ziółkowska-Łajp, Anna Demuth, Marek Drozdowski,
Urszula Czerniak, Magdalena Krzykała

The evaluation of sexual dimorphism of somatic features and body composition of young people doing water sports

Introduction. The opinions on masculinisation of body build of female athletes have been partly reviewed with extensive studies in the area of anthropology, however due to intense sports competition the problem still seems controversial, and thus it remains open and requires constant monitoring already in the initial stages of sports training of girls.

Aim of the work. The aim of the study is to analyse the differences in the levels of selected morphological parameters between boys and girls practicing rowing, canoeing and swimming.

Material and methods. In the group of 173 male and female athletes aged 15 and 16 years anthropometric measures of 12 somatic features were carried out and the body composition was established using a bioelectric impedance method (a percentage content of fat, water and lean body mass). The differences in the level of analysed features between boys and girls were estimated using Mollison index and Student's t-test for independent samples.

Results. Among fifteen-year-old girls, the swimmers are most similar to boys in terms of size of musculature (expressed as circumferences of analysed body parts) and distribution of underlayer of fat tissue, and among older, sixteen-year-old female athletes – the rowers. In the studied groups of girls doing such different disciplines of water sports and in boys doing the same disciplines as the girls, as well as in groups formed on the basis of metrical age, correct relations of fat mass content and active mass content were noted. However, results indicating a low share of water in body composition in sixteen-year-old girls practicing swimming are worrying.

Conclusions. The results lead to the conclusion that active participation in sport does not cause any significant disturbances in the features diagnosed as dimorphically differentiating.

Key words: somatic features, body composition, sexual dimorphism, water sports, young people

Przemysław Bujas, Dariusz Tchórzewski, Janusz Jaworski

Asymmetry of supporting and stabilizing function of the lower extremities in alpine skiers

Introduction. Skiing like other sports has its own specific postural requirements for the competitor's balance. The above specificity also refers to the asymmetry since each ski competition requires efficient mechanisms for bilateral control of athlete's stability.

Aim of the study. Investigating the asymmetry level of stabilizing function in lower extremities of alpine skiers.

Material and methods. 11 participants, 3 women and 8 men – alpine skiers, were involved in the study aimed at identifying the level of functional asymmetry during stabilometric measurements performed with the use of stabilographic platform CQ Stab.

Results. The measurements reveal asymmetry mainly within the indicators of the frequency of correction foot pressure, the speed of oscillation and the surface area, and distance travelled by COP. Recorded values indicate the predominance of the left lower limb in a stabilizing function. This asymmetry does not manifest itself in distribution of mass but in worse indicators of the stability for this limb, especially in ML plane.

Conclusions. Asymmetry in stabilizing function found in young skiers corresponds to the observation made on not practicing skiing youth and adults. Further studies need to determine the relationship between the level of asymmetry and the effectiveness of a skier during the competition.

Key words: asymmetry, coordination motor abilities, balance

Władysław Machnaczk, Jarosław Nosal, Andrzej Dudkowski, Paweł Chmura, Andrzej Rokita

Relationship between the effectiveness of young players activity in one-on-one games and the level of selected coordination abilities

Aim of the study. Among most valid, however little known, aspects of sport studies are selection and training of talented children. From this viewpoint the assessment of sport achievement predictors of various motor fitness indices seems to be crucial. The study aims to verify a hypothesis about the impact of selected coordination abilities on playing effectiveness in children at the introductory training stage.

Material and methods. The sample comprised 18 boys from the ODRA Schoolboys Football Club from Wrocław, Poland, who took part in the Wrocław Junior Football League organized by the Lower Silesian Football Association. The boys, all aged 12 years (± 0.5 year), were at similar sports and health level. Playing effectiveness was measured with the help of one-on-one games. The measured coordination motor abilities (CMAs) included: 1) static balance, 2) dynamic balance, 3) kinesthetic differentiation.

Results. The levels of examined coordination motor abilities do affect the playing effectiveness of young football players in one-on-one games. All noted correlations were statistically significant ($p \leq 0.05$).

Conclusions. The tests of coordination abilities are important for training and selection of young football players however a new, more useful dynamic balance test should be developed.

Key words: soccer, one-on-one game, motor coordination abilities

Henryk Duda

Influence of intellectual instruction in streamlining the performance with a ball on motor effectiveness in a football player

Aim of the study. To explore the nature of the intellectual preparation in sports games with a view to evaluate the importance of intellectual (didactic) instruction in streamlining the effectiveness of motor performance with a ball in a football player accordingly to the basic research question: does the streamlining intellectual instruction exert a positive influence on motor effectiveness of a football player?

Material and methods. In the study on evaluating the influence of intellectual analysis in action on motor skills, which was conducted in the years 2009 and 2010 in the Krakow's Football School, a group of 32 young football players (in older junior age category) was involved. As a research tool so-called creative action test was used to measure the effectiveness of actions leading to goals striking in accordance with the previous impact analysis. The reliability of the test was $r = 0.89$.

Results and conclusions. The obtained results have proved the increase in the effectiveness of the motor performance of football players that was caused by the intellectualization of training process. Simultaneously the usefulness of searching for the mental disposition reserves in football players aimed at improving the effectiveness of training has been indicated.

Key words: efficiency of motor action, mental analysis, test of creative actions, football

REVIEW PAPERS

Vladimir Lyakh, Przemysław Bujas, Leszek Gargula

The effects of training on preparation of highly qualified football players: review

Aim of the study. Team games including football are among the disciplines in which the assessment of individual training activities of athlete is difficult. This follows from incommensurability of effects – especially the sports competition. Thus becomes important to introduce more stable criteria and methods supporting a player and coach in the evaluation of the effectiveness of its preparation. Current science provides us many modern methods to monitor the post-training changes in athletes in the physiological-biochemical, mental as

well as motor adjustments. The article is an analysis of modern approach to assess the course and the effectiveness of training impact on the example of football.

Material and methods. Analysis of selected contemporary literature.

Results. On the basis of various criteria and the size of functional indicators, authors present modern structure of training effects beyond the most commonly cited direct, prolonged and cumulative effects, by introducing the concept of remote and final training effects. Remote training effects are manifested in the delayed accumulation of influences of training on the change of competition outcome. They are particularly important in exteriorizing the coordination abilities and the maximum speed for which the level of fatigue-rest affects particularly the neuro-muscular coordination. The final effects of training state the period during which an increased level of physical capability remains above reached immediately after cessation of the impact of specialist training. Because of time of the post-training changes in the body there are two sub-effects: short- and long-term ultimate effect. Much of the first one is particularly important for the control of training process.

Conclusions. These training effects govern the interaction of coach and athlete. Understanding of their characteristics is essential for planning and analysis of the training process, making its effects more controllable and predictable.

Key words: training, effect, football player

DISCUSSIONS

Emilia Mikołajewska, Dariusz Mikołajewski

Novel technical solutions in gait re-education

Diseases, injuries and other pathologies can alter gait patterns including biomechanical features, controlled by the central nervous system for economy and stability. This article reviews the basic solutions of rehabilitative robots and exoskeletons in gait re-education and then considers how the principles may be applied to use them in clinical gait pathologies therapy.

Key words: gait rehabilitation, gait physiotherapy, gait re-education, gait analysis, rehabilitative robots, exoskeletons
