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APPLICATION OF THE "SYSTEM YOGA IN DAILY LIFE ©" TO PROMOTE PERFORMANCE, HEALTH AND RESILIENCE IN ATHLETES

Zuzana KORNATOVSKÁ, Milada KREJČÍ

Abstract

The article is focused on the applications of yoga techniques according to the scientific master system, authored by Paramhans Swami Maheshwarananda, offering health and harmony of Body, Mind and Soul, and which is globally popular. The "System Yoga in Daily Life ©" is based on the traditional Indian concept of Yoga Vedanta and develops the human health potential systematically from simple exercise units to the most demanding training techniques. The system is unique that it contains methodically developed yoga techniques for athletes. Yoga is useful both for elite athletes and hobby athletes. Especially the hobby athletes often train without a professional supervision of trainers, what may cause health problems due to unreasonable, often sudden training or competition loads. The presented applications of the "System Yoga in Daily Life ©" concern four areas: "Compensatory physical exercises", "Breath exercises", "Mental training" and "Diet" of athletes with modifications according to age and sports level.

Keywords

Sport and yoga; "System Yoga in Daily Life ©"; Elite sport; Hobby sport; Examples of yoga applications.

1. INTRODUCTION

Athletes face difficult situations to improve their performance. They are exposed to physical and mental stress and physical demands during the continual every day trainings and competition processes. Therefore a regular and systematic regeneration has significant importance for the health and resilience promotion of athletes. By the term resilience we understand a process of psychological reintegration based on the ability to strengthen the skills to manage stressful events in life of athletes. Resilience promotion may contribute to athletes' psychological well-being and reduce psychological distress (De Melo & Noce, 2020; Henriksen, Schinke, Moesch, McCann, Parham, Larsen, & Terry, 2020).

Yoga represents a traditional, more than five thousand year old, highly sophisticated regeneration system, leading to the development of a person's physical and psychological potential and to the promotion of health and an increase in the quality of life in general. It is therefore understandable that the application of yoga in the culture of sports, both in terms of supporting sports performance and performance development, and in terms of supporting health and compensating the physical and mental stress of the athlete, represents a significant and actual focus of contemporary research.

Sharma (2015) declares that a specific sport can lead to muscle imbalances and over time, this process causes an imbalance in the joints, leading to overuse injuries. Yoga helps muscles, tendons and ligaments move through a full range of motion, cultivating balance and core strength, which is a huge benefit for athletes in their chosen sports. Sharma (2015) states that attention to the breath during yoga can be considered one of the most important benefits for athletes, because connecting the mind and body in yoga is essential to helping athletes develop mental acuity and focus. Yoga helps to relax not only tense muscles, but also an anxious and overloaded mind.

The "System Yoga in Daily Life ©" is based on the traditional Indian concept of Yoga Vedanta and develops the human health potential systematically from simple exercise units to the most demanding training techniques. It represents a scientific, globally popular, system of yoga techniques, authored by Paramhans

Swami Maheshwarananda, offering health and harmony of Body, Mind and Soul. The education and training program “System Yoga in Daily Life ©” was created and formed on the basis of the yoga tradition passed the line of yoga masters and on the basis of the experience with the mentality and the physical features of a man "from the West." In young age Paramhans Swami Maheshwarananda came to Europe from India in 1972 and founded the Austro-Indian society for Yoga and Vedanta in Vienna. From that time till nowadays is the “System Yoga in Daily Life ©” spread globally throughout the world because implemented very methodically and sophistically all components of human health, including philosophical and spiritual aspects of health. From that time yoga education and training were developed systematically according the best Indian yoga tradition and quickly gained high interest across the country inspiring in the form of lectures and yoga workshops. Paramhans Swami Maheshwarananda gave a high attention to the negative consequences of the sedentary hypokinetic style, which intervened significantly in recent years even in the child population. Therefore the “System Yoga in Daily Life ©” was created by him so, that anyone could gradually begin to practice yoga (Krejčí, Hornof, 2016).

After 1990 Paramhans Swami Maheshwarananda focused particularly on education and training of certified instructors for the “System Yoga in Daily Life ©” in Czech Republic. Since the autumn of 1990 to 1994 he held personally the complex of intensive seminars for yoga instructors under his direct guidance (Krejčí, Hornof, 2016; Oriňáková, 2019).

Yoga can be useful both for elite athletes and so-called hobby athletes, men and women, who often train without the professional supervision of trainers and can cause health problems by unreasonable overloading, especially the so-called impact training and competition load. Injuries that occur both in performance sports, hobby sportsmen and recreational sports, and which are a major problem causing significant economic losses to the state health system, can be largely prevented by compensatory yoga techniques (WHO, 2018; Boullosa, Esteve-Lanao, Casado, Peyré-Tartaruga, Gomes da Rosa & Del Coso, 2020).

In a bibliometric analysis of yoga research in the years 2007-2014, the authors Büssing, Michalsen, Khalsa, Telles, Sherman (2012), relevant publications document the positive effect of yogic breathing on depression, as well as on the reduction of fatigue and anxiety both in healthy people and in patients with cancer, multiple sclerosis, diabetes, chronic pancreatitis, fibromyalgia and asthma. The authors further state that in the analyzed studies, significant positive changes were presented in the level of fitness parameters, in walking, balance, body flexibility, and increased muscle strength and weight loss. The given bibliometric analysis also includes studies of the application of yoga for the treatment of back pain, rheumatic arthritis, headache and migraine – in all these studies positive effects of yoga interventions were reported. When it comes to chronic back pain, studies show that yoga was more effective than standard interventions, including usual care or conventional therapeutic exercises.

Research studies of Dostálek, Lepičovská (1982), Motajová (1997), Krejčí & Jandová, (2021) prove the positive psychosomatic effect of yoga on homeostasis and human health and in the field of preventive medicine. The results of the studies (Harada, Wada, Tsuji, Krejci, Kawada, Noji, Nakade, Takeuchi (2016); Mandelbaum, Harada, Takeuchi, Tsuji, Krejčí, 2017) show possibilities for the adoption of self-regulation techniques in the training process of young athletes, e.g. relaxation techniques, free regulation of breathing in athletes in the context of circadian interventions.

2 AIM

The aim of the presented paper is to determinate applications of yoga techniques according to the “System Yoga in Daily Life ©” into health promotion and resilience promotion in athletes.

3 METHODS

For the presented study we used methods of analysis, synthesis, induction and deduction as well as causal and operational thinking. A synthesis of evidence and a critical and reproducible summary of the results of available publications on the subject were performed as well.

The study is based on the three-stage research process:

- Observation, description of established terms used, sometimes currently created and defined, followed by documentary description.
- Grouping observations into categories with determined attributes and summarized into a theoretical concept explaining how a certain set of attributes in a subsystem leads to certain resulting phenomena.
- The final resultant to the prediction of phenomena that may occur in different situations.

4 RESULTS AND DISCUSSION

However, the systematic integration of yoga techniques into sports training was already introduced in the Czech Republic in 1980 by the Indian yoga teacher Paramhans Swami Maheshwarananda, whose cycle of lectures in Brno at the invitation of the Association of Sports Associations was well received and the recording of the lectures was repeatedly published (Liberdová, Doležalová, 1990).

Paramhans Swami Maheshwarananda (2005) developed yoga techniques for the purposes of sports and coaching practice, which are interpreted in the given study in the following four areas:

- Mental training based on yoga techniques in performance and elite sports
- Breathing exercises – breath regulation
- Compensatory physical exercises – sets of exercises compensating for the unilateral load of sports specialization and at the same time balancing the vegetative nervous system
- Diet

4.1 Mental techniques

Yoga is based on intuitively and empirically known relationships and regularities between the physical and psychological areas. Above all, yoga emphasizes the importance of the mental climate in which we want to achieve success. Physical strength has its limits. According to yoga, mental strength ultimately determines physical performance more than just trained physical strength. For this reason, control of the mind, especially of ideas, thoughts and decisions, is important. E.g. you need to say to yourself "I will do it, I can do it, I can do it" instead of "I will try". There are already certain doubts about it, the idea that I will fail. If a person wants to be really successful, it is necessary to train the mind in such a way that the goal can be achieved. A negative idea, negative thinking weakens a person. This is also important for life outside of sports. A positive approach to activity strengthens the will, develops the ability to concentrate and prepares the ground for success. What attitude to take towards rivals? According to yoga, by having a negative attitude towards the rival, the athlete creates a negative mental atmosphere, which ultimately leads to his own weakening. The athlete should be filled with the certainty of his own quality, the certainty that he will win fairly and wish success to The consensus that yoga breathing exercises improve the mental health of high-performance athletes is confirmed by the following authors of research studies (Krejčí, Psotta, Hill, Kajzar, Jandová, Hošek, 2020; Henriksen, Schinke, Moesch, McCann, Parham, Larsen, & Terry, 2020; Kauts & Sharma, 2012; Kamei, Toriumi, Kimura, Kimura 2001).

4.1.1 Concentration and mobilization of energy

Being able to focus is very important for success in sports, but also difficult. In yoga, the so-called "dharana" is important, i.e. the art of concentrating on one thing only, without thoughts drifting elsewhere (on possible failure, on fatigue, on illness, etc.), which leads to a weakening of performance.

Furthermore, there is one more situation during a sports competition, namely physical weakening in the form of exhaustion. Here, yoga provides two kinds of techniques to mobilize energy. These are relaxation techniques and breathing techniques. At the same time, it should be noted that in yoga the issue of relaxation and breathing is much broader than just the problem of energy mobilization.

In the case of energy mobilization, this is the ability to "be able to relax during activity".

When the mind is tense, the body is also tense. Sports performance can be completely crippled by high tension. Energy mobilization is created by the combination of relaxation and concentration. This apparent "extra energy" will arise in a situation where the mind is relaxed, focused on the goal, and the athlete also physically feels tension-free. Then a state occurs, as if a source of energy has erupted in the body, a volcano of energy. This must be practiced in yoga training, then in the athlete's regular training, and then used in competition.

In line with this, Kauts & Sharma (2012) report the study findings that the yoga module intervention improves concentration and short-term memory scores, which can have a positive effect on any performance.

4.1.2 The importance of relaxation before performance and post-relaxation activation

Yoga has a number of techniques that practice relaxation for a good performance, but also relaxation that helps regeneration after performance. For athletes, this means a different relaxation technique before the competition and a different one after the competition. Relaxation before competition (or before training) should be aimed so that athletes are relaxed, but at the same time activate internal energy for performance.

Here is an example of such relaxation before exercise according to the Yoga system in daily life:

- Lie on your back.
- Gradually relax the whole body.
- Become aware of the relaxation of the body from the feet to the head.
- Cancel body tension.
- Relax your breathing and thereby relax yourself inside.
- Relax mentally.
- Let the thoughts come and go, i.e. do not allow any thought to come back and remain in the mind. Send it away and feel the release of your body and breath.
- Similarly, send away your emotions.
- When you relax like this and have no lingering thoughts and emotions, you feel the relaxation deepen. Relax more and more, deeper and deeper.
- Now feel how you are breathing. Do not change the depth or rhythm of your breath.
- Just be aware that you are breathing in and breathing out. Your breath flows completely freely, naturally.
- Now feel the breath in the center of the chest. Feel the breath flow. You feel the waves of your breath moving through your entire body.
- Now imagine how your vitality increases with your breath. With each inhale, you are charged with new energy, and with each exhalation, this energy continues to flow through the body until it permeates the entire body.
- Feel this new vitality in the feet, in the toes, in the insteps, in the ankles.
- Feel a new vitality from the area of the ankles rising to the area of the knees. Feel the rising vitality in the knee area, perhaps as a feeling of warmth or other expression of energy.
- This energy spreads further – to the thighs to the hips. You feel energy throughout your legs.
- In the same way, feel this energy with your breath in your palms and fingers.
- Feel how it moves up to the elbow area, to the shoulders, and over the shoulders to the neck, to the nape of the neck.
- Perceive this energy with your breath in your torso – you feel it in your back muscles.
- Feel it in your abs.
- The whole body becomes charged with energy, vitality, it is more alive.
- Feel the same revival now in the area of the face and neck, in the area of the whole head... When you inhale, you feel the warmth of this vitality...
- You are still in relaxation, but at the same time you are getting into a state of alert consciousness and watching your thoughts. You feel very fresh.

- Visualize what you want to achieve as already accomplished.
- See what you want to achieve as a living reality.
- Imagine yourself in motion. You do this move with the vitality that you just charged up that you gained. This energy helps you perfect your movements and gives you the strength to endure.
- Feel everything absolutely concretely. You are successful, everything is going well, everything has been done.
- You win. You won.

Post-relaxation activation: You deepen your breath, preparing to return to the waking state. You begin to gently move your fingers and toes. You feel how the acquired vitality manifests itself in the movements of the fingers. Breathe consciously, move your legs and arms. Stretch yourself. Inhale and stretch your whole body. Roll your body to the right, to the left, more and more movement... Now rub your palms until they are warm, put them on your face and warm your eyes. Slowly open your eyes under your palms, move your palms away and sit down. Relaxation is over.

This was an example of the possible relaxation that can be induced in the right condition for activity, for performance. It takes about 15 minutes. You can purchase an instructional recording and play it back. This is a type of relaxation that belongs to the "yoganidra" technique in yoga. It can be combined with self-suggestive formulas (called "sankalpa" in yoga), which has been very successful in sports practice. The technique can be performed individually or in a group (Maheshwarananda, 2007).

In accordance with the above declared text, the authors Pandi-Perumal, Spence, Srivastava, Kanchibhotla, Kumar, Sharma, Gupta, Batmanabane (2022) of two neuroimaging studies have shown that yoganidra produces changes in endogenous dopamine release and cerebral blood flow, a further confirmation that its effects on the CNS are objectively measurable. They state that the calm inner stillness induced by yoganidra is claimed by practitioners to be an effective stress management tool as well as a means for attaining greater receptivity to personal resolutions. These resolutions can range from the goal of achieving self-transformation, enhancing creativity, or improving one's learning ability. Additionally, yoga nidra is claimed to promote beneficial changes in physiological and mental health.

The second type of relaxation is relaxation used after sports performance. With its help, they regenerate the muscles and the entire organism of the athlete. This is also a “yoganidra” technique, but after reaching a state of deep relaxation, specific ideas of regeneration of physical and mental forces are given. If this second type of relaxation is used after training or after a competition, muscle pains, muscle spasms, and strain do not occur. Even for this relaxation, 15-20 minutes is enough. It should be done after every training (Maheshwarananda, 2007).

4.2 Breathing exercises

Breathing exercises represent another option in yoga to get energy when we need it. One of the reasons why we feel a lack of energy is poor management of oxygen, insufficient supply of oxygen to the tissues. Most people have bad breath. Correct breathing technique ensures an automatic supply of energy. For this reason, even proper breathing should take place automatically. Natural mechanisms related to breathing (e.g. holding the breath during inhalation when lifting a load) are processed in yoga in an extensive system of breathing exercises (so-called "pranayama"). Pranayama training can be used in order to obtain the correct breathing automatisms even for long-lasting stress, e.g. in peak performances. However, it is necessary to include them in the long-term training process.

4.2.1 Three types of breath and full yoga breath

According to yoga, we recognize three types of breathing, each of which can predominate or, on the contrary, decrease in the athlete's breathing. These are the following types of breath:

- Lower, diaphragmatic breathing.
- Medium, chest breathing.
- Upper, subclavian breathing.

For proper breathing, it is necessary to harmonize all three types, with the most important being able to properly use lower, diaphragmatic breathing. Krejčí (2021) states that proper breathing also enables proper muscle relaxation. Muscle tone is largely influenced by breath.

In case of nervousness, shallow upper, subclavian breathing prevails. To get rid of nervousness, to calm down, the following exercises according to the Yoga system can be used in daily life: Take a deep breath, hold your breath for a while and slowly exhale and hold your breath again. Breathe like this until you feel calm.

In sports, mastering the so-called full yoga breath is a basic prerequisite. It is breathing in which all three types of breath are applied. Only when the correct way of breathing becomes completely automatic can other special breathing techniques of pranayama be practiced. Practicing full yoga breathing takes time. Some yoga positions that affect the respiratory components in a specific way help during training, see in detail (Yoga in Daily Life, 2023).

4.2.2 Pranayama

In the presented text, only brief essential information can be given. Pranayma includes three breathing phases: inhalation, exhalation, breath retention. Different variations of pranayama arise from modifications of these phases. Pranayama technique "bhastrika" can be recommended for athletes. It is very useful for refreshing the athlete and for his mental relaxation. The literal translation of the term "bhastrika" is blacksmith's bellows. We perform rapid inhalations and exhalations at a rate of two breaths per second. Even though the pace is fast, “bhastrika” should be done in a relaxed manner. Here is a description of the exercise “*Bhastrika” according to the “System Yoga in Daily Life ©”* (Yoga in Daily Life, 2022):

Relaxed, upright sitting position, hands on knees. Then we will place the middle finger and the index finger of the right hand in the middle between the eyebrow and the thumb, and we will alternately use the ring finger to close the left or right nostril. Close the left nostril with the ring finger and inhale and exhale twenty times through the right nostril in a regular rhythm of two breaths per second. Then we do a slow inhalation and exhalation. We switch fingers, close the right nostril with the thumb and take twenty inhalations and exhalations through the left nostril. This is followed by a slow inhalation and exhalation again. Then we place the right hand on the thigh and take twenty inhalations and exhalations through both nostrils at the same pace and manner. Then we inhale, hold our breath briefly and slowly exhale. This is the initial exercise, one cycle. We gradually increase the number of breaths until finally we perform three times fifty inhalations and exhalations in one cycle. Up to three cycles can be performed sequentially.

The state of mind is also important when practicing pranayama. It is best to be in a positive frame of mind. Then you will breathe well.

Similarly to declared benefits the authors Bhavanani, Madanmohan, Udupa (2003) report in their study that bhastrika pranayama may stimulate reaction time positively determinate sensory-motor performance. It has been reported that yoga training improves human performance including central neural processing.

4.3 Compensatory somatic yoga exercises

Compensatory body yoga exercises should balance the one-sided body load that occurs during sports discipline training. In this compensatory training, yoga positions are applied in a certain sequence (Maheshwarananda, 2005). Movement in yoga compensatory exercise should always be conscious, in harmony with the breath, with a relaxed mind. In a yoga position, we should stay as still as possible, relaxed, with pleasant feelings, with attention to feeling the breath in the body. Maheshwarananda (2005) recommends simultaneously perceiving the pulls and pressures and the overall effect of the position on the body. This concentration should be completely relaxed and alert. It is characteristic of yoga compensatory exercises (asanas) that they affect not only the body area (muscles, joints, organs, glands), but also train the development of psychological qualities, such as concentration, alertness, relaxation in activity.

For athletes, we mainly consider the physical effects of asanas.

Many athletes have stiff joints and their body cannot always move as they would like (e.g. stiff back muscles). It is necessary to realize that fast movements shorten the muscle in a short time, but it takes longer to relax and stretch it. That is why stretching exercises, which stretch the muscles in the right way, are so important for athletes in addition to relaxation. Guszkowska, (2007) declared that the stretching is very effectively induced by yoga sets. Thus, yoga includes much wider effects in the body area than just stretching. These are compensatory yoga exercises that stretch the muscles both by direct stretching and twisting in a given position. It acts on superficial and deep muscle layers, especially in the spine area. In addition, the endurance in the asanas stimulates the functions of the internal organs and balances the activity of the vegetative nervous system, see the exercises listed, for example, in the publication “Yoga for a healthy back” (Maheshwarananda, 2021). The “System Yoga in Daily Life ©” also includes dynamic sets that can be performed with an aerobic effect.

Yoga set Bari Khatu Pranam

The stiffness of certain joints and muscle areas in sports is mainly due to the fact that fast movement is typical for sports. This fast movement should therefore be compensated by a slow, relaxed, controlled movement in harmony with the breath. The Bari Khatu Pranam represented a compensatory yoga set, developed by Paramhans Swami Maheshwarananda, which gradually stretches all major muscle groups, stretches shortened muscles, warms up the body and regenerates its vitality. It is a set of 27 positions that flow smoothly into each other. The assembly can be practiced dynamically, but slowly with great attention to harmony with breathing. This achieves conscious control of the movement with sufficient time for blood exchange in the muscles. The set can also be practiced with endurance (staying in each position for several breathing cycles). This will allow the athlete to exercise more slowly than usual, with full concentration. It is advisable to carry out the assembly especially after sports training. It will help to "charge" the muscles with energy. The entire set exercise is described by Repko (2022) and illustrated in the diagram (Figure 1).

Figure 1 Overview of following 27 postures of the “Bari Khatu Pranam" yoga set (Yoga in Daily Life, 2019)

Use of yoga exercises according to the "System Yoga in Daily Life ©" have been repeatedly investigated with highly positive results on the performance and rehabilitation of athletes and employees by the authors Kornatovska, Rehor, (2021), Bednár, Kňazovická, Melichová (2020); Oriňáková (2019), Krejci & Kornatovska (2017).

4.4 DIET

In general, yoga places great emphasis on diet and relies on the knowledge of Ayurveda, according to which diet is important for all areas of life. The "System Yoga in Daily Life ©" also recommends a regulated diet for athletes not only during the competition period, but also during training preparation.

Diet for athletes should be easily digestible, always fresh, freshly prepared. The method of preparation is very important, because improper cooking can spoil the food. Paramhans Swami Maheshwarananda (2005, 2007) advises not to eat anything that contains chemical additives and does not recommend athletes to eat canned food. The diet should also contain enough uncooked, raw ingredients, especially more fruit, more leafy vegetables, or more juice from raw root vegetables. The diet should also contain cereals, possibly sprouted, milk and milk products, nuts, honey and legumes.

The stated facts are in accordance with analysis of diet in young elite athletes, where it is stated that factors that may influence the overall health of elite athletes, such as stress behavior, self-esteem, nutrition, and sleep have been less in focus, especially among adolescent elite athletes. Exploring such health variables could deepen our knowledge regarding overall health, injury occurrence, and athletic performance (Von Rosen, Frohm, Kottorp, Fridén, Heijne, 2017).

5 CONCLUSIONS

In conclusion, it should be summarized that the application of yoga according to the "System Yoga in Daily Life ©" can be effectively used in the training process and in competitive situations of athletes. Here it is possible to understand the whole life of a person as a certain "race" that matters to us. And what matters most? Back to training. It is internal training, training of internal attitudes and correct life values. Thus, yoga can be understood as a tool leading to happiness and harmony in life.

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CORRECTION OF DEFECTIVE FOOT POSITION IN A PRESCHOOL CHILD – CASE REPORT

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Abstract

The presented work deals with the topic of defective foot position in a preschool child and the possibilities of its correction. It takes the form of a case study, presenting the case of a preschool boy with a defective leg position and the content and results of the intervention that resulted in an improvement. The basis of the intervention was movement therapy, the potential benefits of which are often underestimated in practice, but a necessary condition for achieving them is the motivation of the child and his parents to carry it out regularly and methodically correctly.

Keywords

Defective position of the foot, flat feet in children, movement intervention.

1. INTRODUCTION

We are witnessing in the world an increase in the number of lower limb diseases, defects and deformities. Especially in preschool age, we can observe an alarming incidence of flat feet. In the literature, this increase is reported to be as high as 95% (Novotná, 2001). The etiology is multifactorial, but hypokinesis and the higher prevalence of obesity in children play an important role (Levitová, Hošková, 2015). Adamec (2005) and Novotná (2001) list flatfoot as one of the most common diagnoses for which paediatric patients are referred to orthopaedic outpatient clinics.

Children's flat foot is a deformity that develops during the growing years. The exact cause is unknown, but obesity, malnutrition, prolonged bed rest or wearing inappropriate footwear may be involved. If the predisposed foot is loaded in this way, there is subsidence of the femoral head (plantar, medial), valgus heel and roll of the forefoot externally. Thus, the body's centre of gravity shifts to the inside of the foot and overloading occurs (Adamec, 2005).

The child's foot develops in terms of structures and function, even after the completion of verticalization. The bones do not reach their final shape until adolescence. Therefore, in the first year, we observe in children a physiological slightly varus position in the rearfoot, the forefoot in supination and a physiological buckling of the knees. With progressive growth and changes, around the third year, the heel position changes to valgus and the forefoot to pronation. By three years of age, valgusness up to 15 degrees is considered the norm. Buckled knees are physiological for this period. During growth, the limb axis flattens and the heel position should also flatten, only in larger defects does the concave or pronated position of the feet persist and the arch of the feet, therefore, does not develop (Levitová, Hošková, 2015).

"The flatfoot in a child must always be placed in the context of the whole body. If the child is completely healthy and yet has a sagging arch, it is a primary flatfoot. But if the flatfoot is one of the manifestations of the overall disability, then we call it secondary flatfoot. Secondary flatfoot does not cause diagnostic confusion and there are more or less proven treatment procedures. Primary flatfoot, on the other hand, is a problem that is not resolved and in the approach to it there is no consensus. (Teyssler, 2020, p. 35)

The most common symptoms that children complain of, are in most cases, post-load pain on the inside of the leg at the point of the hamstring tendon attachment tibialis anterior, on the outside of the leg below the ankle over the peroneal tendons and in the area between the ankle and the heel bone (Teyssler, 2020).

Flexible flatfoot in children is usually painless. Therefore, in most cases, children present for examination because of parental concerns about the appearance of their feet and/or

because of positive family history. The clinical evaluation of a child with flat feet should primarily focus on a general musculoskeletal examination (Mosca, 2010). Evaluate the condition of the foot can be assessed in a number of ways, some of which are very simple and can be done in the home environment. Conversely, more accurate examinations require modern instrumentation and expert evaluation. The basis of the assessment of the plantar surface of the foot is taking an imprint of the foot (Levitová, Hošková, 2015). The examination should begin with checking the wear pattern of the upper sole of the shoe. The physiological wear pattern should be around the posterolateral heel area, which is the area of initial contact with the sole at heel impact during gait. A child with a flat foot, however, may exhibit a posteromedial heel wear pattern (Turner et al., 2020).

The flatfoot can be examined with many tests, such as the heel rise test, jack test or Silfverskjöld test (Havlas and Teyssler, 2017).

During the examination, the stance and the way of walking should be further analysed, first in shoes and then barefoot. Particular attention should be paid to the assessment of heel valgus, the angle of progression of the foot and any rotational deformity. When observing from behind in the standing position, note the angle of the Achilles tendon near the abductor and also the alignment of the calcaneus.

Diagnosis is made by the physician from clinical examination and plantogram evaluation. X-ray of the foot is indicated only when the patient is in significant difficulty or if there is diagnosis confusion, especially with more severe pain lasting beyond rest and in relief, one must look for other causes of the difficulty (Adamec, 2005).

Podoscopic examination provides significant information. The podoscope is a modern diagnostic device that diagnoses orthopaedic foot defects. At durable acrylic plate with polarized light, defects of the small joints of the foot can be detected, the position, pressure and rotation of the heel bones and individual parts of the foot in relation to each other, as well as detecting defects in the axes of the ankle joints. On the basis of the pressure image, it is possible to assess the state of statics and dynamics of the feet. In the research related to this work, diagnostics were performed using the PodoCam device, which consists of two webcams and software. PodoCam allows the system to keep a patients record, take images and videos and compare the two examinations.

As with most orthopaedic diseases, the treatment options are conservative and surgical. Conservative treatment includes the use of orthotic insoles that help in supporting the arch and guiding the heel. Orthotic insoles do not serve to treat the foot, but only function as an adjunct to treatment and supplement in healing after surgery (Teyssler, 2020). The controversy regarding treatment procedures and especially the use of insoles is mentioned by Dungl (2014), who points out the careful consideration of any treatment for flat feet. He does not treat first and second degree flatfoot nor does he recommend orthotic inserts or shoe modification. As the most appropriate measure, he states barefoot walking, stretching (especially of the triceps calf muscle) and foot gymnastics, which takes the form of play, as the most appropriate measures. He also states that it is not necessary to prescribe physiotherapy in this case. In the third stage, orthopaedic insoles are already prescribed. Turner and colleagues (2020) mention physiotherapy as an essential element in the treatment, which eliminates muscle imbalances, activates flaccid muscles and stretches shortened ones.

Operative treatment is resorted to when pain and fatigue of the leg is prevented or when conservative treatment and therapy are ineffective. This type of treatment involves procedures on tendons, bones or a combination of both. Most children's flat feet will adjust spontaneously during growth as the hypermobility and maturation of ligaments. Teyssler (2020) states that although orthotic inserts are a widely used means of conservative treatment, they are often prescribed in a general and routine manner, yet the use of these aids is not necessary in every case. Thus, we often see children who wear orthopaedic insoles and do not need them at all, and conversely,

there are children whose findings signal a condition for a surgical solution, yet the only treatment tool is orthopaedic insoles.

"In physical education and physiotherapy, we are based on the principles of sensorimotor science, i.e. on the fact that motor function is influenced by the sensations or information that the system receives. For us the most important in this respect is the exteroreception (the perception of information from the external environment, i.e. such as touch, pressure and heat) and proprioception (semi-sensation and movement, information from muscle spindles and Golgi tendon bodies). A sufficient amount of stimuli has a positive effect on the healthy development of the foot arch. Nowadays, the perception from the receptors is considerably dampened. Children wear inappropriate footwear and the plantar surface of the foot does not receive enough stimuli. For proper foot development, stimulation of the foot with an optimal amount of different stimuli is essential.

This is called exteroceptive and proprioceptive stimulation, or the use of receptor facilitation (from the sole of the foot), which can be done in several ways." (Levitová, Hošková,2015, p. 97)

Barefoot walking also stimulates the function of the sole of the foot. Levitová and Hošková (2015) recommend walking barefoot on grass, stones, sand, in the forest, paddling in the water and walking on slippery or rough surfaces. Even in the home environment, there are options for stimulating the sole of the foot. For children, a fun form is suitable. Sensory carpet or orthopaedic flooring or home-made aids are suitable. Barefoot foot cushioning is also recommended.

Levitová and Hošková (2015) also recommend relaxing the skin and subcutaneous tissue of the foot. Foot massages, pressure segmental massages and massages with a special ball, called a hedgehog, are used for relaxation. Mobilisations of the small joints of the foot can also be included. After relaxation, there are significant changes in the sensation of the leg, due to the blood supply to the short muscles.

Regime measures are an important part of prevention. Levitová and Hošková (2015) include: sufficient exercise in the toddler, preschool and school periods, healthy footwear for children, choice of adequate socks, the elevation of the lower limbs to reduce swelling in the ankles and on the dorsum of the foot, correct ergonomic principles of sitting, elimination of factors contributing to flat feet (weight reduction, sufficient physical activity, limitation of permanent avoiding prolonged standing, prolonged walking with inappropriate loads on hard ground and walking in inappropriate footwear.

Some experts also recommend taping. By using functional taping, we can increase the support of the transverse and longitudinal arches of the foot. A taping at the transverse arch of the foot helps the coordinated activity of the short muscles and all the toes towards flexion and abduction. It also promotes the active creation of the transverse arch by supporting the last links of the toes and conforming to the surface (King, 2020).

The basis of movement intervention is health compensatory exercise. The aim of these exercises is to promote the correct function of the short leg muscles and to maintain or increase the mobility of the leg joints. During the exercises, it is important to focus on stimulating the transverse and longitudinal arches of the foot, strengthening the muscles of the plantar foot, restoring flexion and dexterity of the toes, strengthening the LL muscles, stimulating balance with maintaining an upright posture, and generally counteracting permanent deformities (Levitová and Hošková, 2015).

Levitová and Hošková (2015) divide these exercises into several areas, namely the initial warm-up of the feet in standing – walking (on the toes, heels, on the pinky side of the foot), rocking from toes to heels, "caterpillar", relaxation exercises in sitting – movements in the ankle joints, movements of the toes, training of the grasping ability of the chest and feet – picking up objects, drawing on paper, unfolding and folding a towel with the toes, using an obstacle course – stepping on sticks, walking over various objects, practicing proper unwinding of the foot from the mat – practicing accurate footing, feeling the three-point foot support, stabilizing the foot on an unstable surface – balance training, training without visual control, pelvic stabilisation and corrected posture and sensorimotor exercises – foot facilitation, training of pressure distribution on the foot, training of three-point

support in standing and walking, stabilisation of the foot on a labile surface (the limitation of these procedures for children lies in the risk of misunderstanding the procedure).

2 AIM OF THE WORK

The aim of the work is to analyze the condition of the plantar foot in a case study of a selected preschool child and to monitor and evaluate changes before and after the application of the indicated procedures using podoscopic examination.

3 METHODOLOGY OF THE WORK

The method used was the diagnosis and correction of defective foot position in a selected individual aged 5 years. The diagnosis was performed using a plantoscope (PodoCam 2.0) and standing static examination on two Tanita scales. Mayer's line and segmental methods were used to assess the arch of the leg. The correction was performed using selected exercises and regimens that focused on the deep spinal stabilization system (DSSS), valgus knee position, ankle stabilization, and flat foot. Exercises were selected according to the difficulty and age of the proband, i.e., primarily in a lighter and more fun form. Each stack of exercises was modified depending on the results of the proband's continuous flatfoot measurements.

4 CASE REPORT

Medical history

- Personal history

Gender: boy, age: 5 years

Motor milestones – no difficulties, independent walking at 12 months, very frequent use of hanging "bouncer" (risk factor for flatfoot).

History of falls – no difficulties, on the contrary, lower incidence of falls.

Foot and leg pain – around the second year, pain occurred with longer distances, cause not determined.

First podiatric examination at age three. A toe-to-toe gait with a wider base, a symmetrical lying posture, buckled knees, all joints with normal mobility, and a flatfoot, partly still infantile, was found by plantoscopy. The examination also revealed subtalar pronation of about 14 degrees and severe impairment of body stability. The doctor shaped the half-pads.

4 years – after further examination, heel eversion was detected and the half-pads had to be reshaped.

5 years – a follow-up examination was performed and the lying posture was still symmetrical, the length of the limbs was identical, the arches of the feet were formed, the mobility in the joints and the gait were normal. Suspected slight external rotation in the right hip joint. Plantoscopic examination confirmed mild varusity of the right foot with adduction of the big toe.

- Family history

Mother hip dysplasia (treated at an early age – cured), father flatfoot (untreated).

Mother's father thoracic kyphosis, valgus knees.

- Work history

At the beginning of the investigation the proband was a preschooler and at the end already a primary school pupil.

- Social history

He lives with his parents and siblings in the family home.

- Sports history

Swimming from 6 months to 4 years. From 1.5 years to 5 years old exercise for the little ones (motor versatility). Since 3 years old, regular lessons every winter weekend on downhill skis with an instructor. From September 2021 (from 6 years old) he started playing ice hockey.

- Rehabilitation history

Physiotherapy not indicated, but special orthopaedic aids are used and he tries to go barefoot as much as possible in the summer months. Since the age of 3 he has specially shaped half-pads which are changed every six months.

- Current medical history

Flexible infantile flatfoot, body stability disorder, subtalar pronation in the ankle joint.

- **Aspection and examination of the function DSSS (Deep spinal stabilisation system)**
  - standing examination: standing on a narrower base of support, the left shoulder blade is higher and further away from the spine and protrudes, asymmetrical shoulder position – left shoulder is higher, valgus knees, subtalar pronation at the ankle joint, tip rotation and marked valgus knees during gait.
  - DSS examination: unsatisfactory result, abdominal wall prominence – weakened DSSS.

INPUT MEASUREMENT

Input measurements were performed with the selected proband on February 5, 2021. In addition to the aspectual assessment, we measured the symmetry of body weight distribution on two Tanita scales and examined the position of the sole of the foot on a PodoCam podoscope. On the podoscope we observed the flatfoot in free standing position, squatting and single leg standing on the right and left leg. The webcams on the PodoCam allow us to view the foot from below and the heel and ankle joint position from behind.

Tanita scales

Already according to the results of the examination of the aspects we could expect a significant load on the right side of the body, which was subsequently confirmed. The weight on the left side was 10.2 kg and on the right side 13.9 kg. The difference was 3.7 kg and with the proband's weight, it accounts for 15% of the weight difference. We evaluate a very significant difference in loading and therefore a significant disturbance of the orthogonal statics of the body.

- Podoscope

According to the photographs taken from the PodoCam examination, it can be seen that the proband is loading the forefoot more than the rearfoot. From Kapandji's (1985) visual scale, a more pronounced flatfoot on the left foot and a milder flatfoot on the right foot can be confirmed. Looking at the free standing from behind, we can notice the eversion of the heel. This examination is further evaluated using Mayer's line and segment method.

In squatting, i.e. with a higher load, the knees go into a more valgus position and the weight is transferred to the medial side of the foot. In the single leg stance, the weight distribution is shifted to the medial side. Proband had difficulty maintaining stability on one leg, which is to be expected by the given history.

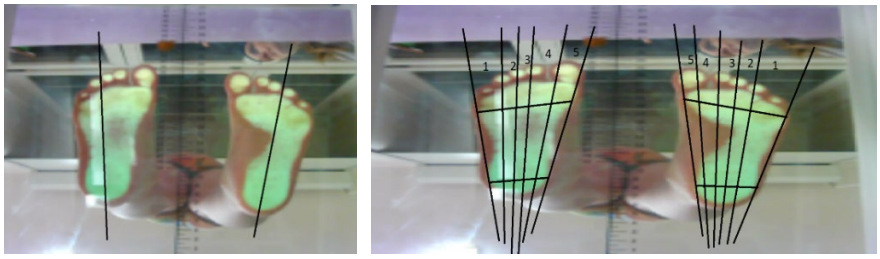
From the plantogram evaluation using the Mayer line, a higher degree of flatfoot. On the right leg, on the contrary, the foot is normal at the segmental interface arched foot and grade 1 flatfoot. In the second method of assessment, the plantogram of the left foot into the fifth segment, which is classified as grade 2 flatfoot. The right leg is on the borderline between the normal arched leg and grade 1 flatfoot, as has already been shown at the Mayer line.

Figure 1 Initial Aspect Examination

Figure 2 Measurements on the podoscope

Figure 3 Input measurement on podoscope – free standing position

Figure 4 Input measurements – Mayer line and segment method



Description of the intervention

Due to the situation regarding the ongoing Covid-19 pandemic, the proband conducted the first part of the intervention independently with the parents in the home environment for six weeks, i.e. from 16 February 2021 to 24 March 2021, when a personal visit took place. We reviewed the exercises, modified and corrected the execution, and added a new stack. We also appealed for foot stimulation in the home environment (orthotic discs, barefoot walking). The parents tried to exercise regularly every day with the proband.

The first stack of exercises focused mainly on flat feet and DSSS. Orthopedic aids and body weight were used.

1. Orthopedic discs: used to walk on tactile discs in the form of a game. The boy named the discs according to their shape: hedgehog, freckle, cushion and ladybird. The discs were used several times a day, first for classical walking or in modifications (blindfolded guessing using only the feet).
2. Lion walk: a slow gait in which the foot falls first on the heel, over the little toe edge and the weight is transferred to the whole foot.
3. Roller: massaging the feet with a special ball "hedgehog".
4. Lifting objects involving the LL toes: the proband's task was to lift a soft ball or other object using only the toes of the foot (activating the longitudinal arches).
5. Horse: changing position from flexed toes to heels (activating the foot).
6. Object sliding: while seated, sliding a heavy object with the outside and then the inside of the foot.
7. Teddy bear: exercises to strengthen DSSS, in a kneeling position the boy slowly lifts his knees off the ground and then slowly brings them back down (teddy bear). In the same position, the boy alternately lifts the LL (teddy bear lifts the foot).
8. Baby: pushing into knees in supine position with legs at right angles (DSSS activation).
9. Pushing into the knees: while seated, proband raises one leg and the opposite arm and pushes the palm of the hand into the inside of the knee.
10. Counter-pressure of the toes in sitting.

The second stack of exercises focused not only on flat feet, but also on modifying the function of peripheral structures. For the DSSS strengthening exercises, equipment common in every household and BOSU were chosen. This stack of exercises was performed from March 25, 2021 until the first interim measurement, June 24, 2021.

1. Fluent walking on heels and toes.
2. Barefoot walking.
3. C-arch – transverse arch release: massage of the transverse arch, which the proband can do on his own or parents can join in.
4. Massage of the longitudinal arch of the foot (activation of the foot arch).
5. Caterpillar: toe flexion and straightening.
6. Broomstick walking (exercise targeting the longitudinal and transverse arches).
7. Standing one-legged on BOSU: proband steps off the ground with right/left foot on BOSU and bends the other leg in front of the leg. In this position he maintains stability.
8. This exercise is used to improve the overall stability of the body.
9. Candlestick: standing slightly straddled, tighten palms up, rotation.
10. Kneeling on the BOSU: kneeling on a balance apparatus, the boy alternately kneels on the LL.
11. Collecting sponges in bowls: bowls according to size and dish sponges were placed in front of the proband, his task was to grasp a sponge with one foot and place it in the bowl. A modification was a variant with the sponges placed on the foot.
12. Stepping on orthopaedic discs. Used to practice and maintain balance and activate the longitudinal and transverse arches.

Interim measurement

The first interim measurement on the podoscope was on 24 June 2021. As the examination was four and a half months later and we had rotated two stacks of compensatory exercises, we felt it appropriate to check whether the static body condition of the plantar foot had improved. Intentionally, this measurement was made before the holidays, as we left the boy without exercise for the following three months and we introduced only regimen and peripheral structure adjustments before he started another new set of exercises with the start of the school year.

- Tanita scales

A slight improvement was noted. We measured a weight distribution of 11.1 kg on the left half of the body and 12.9 kg on the right half. The difference was 1.8 kg, with the proband's weight accounting for 7.5% of the weight difference. Thus, we evaluate the difference in load with a more moderate deviation, and therefore, from our point of view, a significant improvement in right body statics.

- Podoscope

There was also a slight improvement. It is observed mainly in the one-legged standing position, especially on the left leg. Also, there is an improvement in aspectively assessable standing stability and posture of the proband.

Figure 5: Interim measurement on podoscope – free standing position

Regimen modifications

From June 25, 2021, we left the proband without a stack of compensatory exercises (holiday period) and focused only on regimen modifications and foot stimulation. Throughout the three months, the parents tried to make the most of barefoot walking on different terrain (pebbles, sand by the sea, grass) and foot hardening. We kept only orthotic discs and massage.

Exercise stack

In the next period, this third stack was followed by exercises for the flat foot, DSSS and to improve the valgus position of the knees.

1. Beatle with a ball. The boy lies on his back and rotates the gymnastic ball with the help of his arms and legs (strengthening DSSS).
2. Stability on the ball. Proband sits on the gymnastics ball and his task is to take off his socks using only his feet and then grasp the sock, lift the LL and still maintain stability on the ball.
3. Moving objects on all fours.
4. Circling feet with toes together and then vice versa.
5. Caterpillar.
6. Walking on a broom.
7. Roller.
8. Rolling the toes of the feet while lying down. Exercise for valgus position of the knee joints.
9. Orthopedic discs.
10. Bow tie. Pushing the knees to the mat in a squatting position, feet together (exercise for valgus position of the knee joints).
11. Drawing. The proband's task was to draw a picture with the right and left foot.
12. Alternating toe and heel positions.
13. Barefoot walking in the home environment.

It is important to mention that since mid-September the proband started playing ice hockey, three times a week.

Output measurement

Output measurement took place on December 21, 2021. Since the proband started to play ice hockey when he entered primary school, the parents and the boy did not have much time for compensatory exercises and regimen adjustments. Thus, the exercise stack was not filled as faithfully as in previous months.

- Tanita scales

Since the beginning of the introduction of the exercise stack, we have given sufficient attention to strengthening the DSSS, therefore improvements in body weight distribution can be expected. There has been a significant improvement. The weight distribution is 12.5 kg on the left half of the body and 12.6 kg on the right half.

Therefore, the percentage difference in right-sided loading is negligible with a 0.1 kg difference in proband body weight, and significant improvement and resultant symmetry in right-sided loading of the lower limbs can be confirmed. Aspectively, there was also an improvement in the stability of the body during walking and a reduction in valgus knee position.

- Podoscope

When comparing the photographs from the first measurement to the final one, we could notice a significant improvement. Unfortunately, since the interim measurement, the photographs show a deterioration of the plantar flexion of the feet, both in free standing and in single leg standing on the left leg.

In the outcome assessment, deterioration of the plantogram can be clearly observed and is demonstrable in both methods. The left leg is clearly classified as grade 2 flatfoot. On the right leg, there is a clear weakening of the longitudinal arch, which extends to the border between the 3rd and 4th segments. However, the right leg is still classified as grade 1 flatfoot.

The deterioration in the plantogram assessment can be attributed to the sport the boy has taken up. Irregular exercise will also contribute to the deterioration of the foot. Ice

hockey should be viewed as a sport that may be a risk factor in the development of flat feet. The pitfall is the skate itself, which is very rigid and does not allow much movement at the ankle joint, and there is no natural rolling of the foot during the skating stride.

Figure 6 Final measurement on the podoscope – free standing position

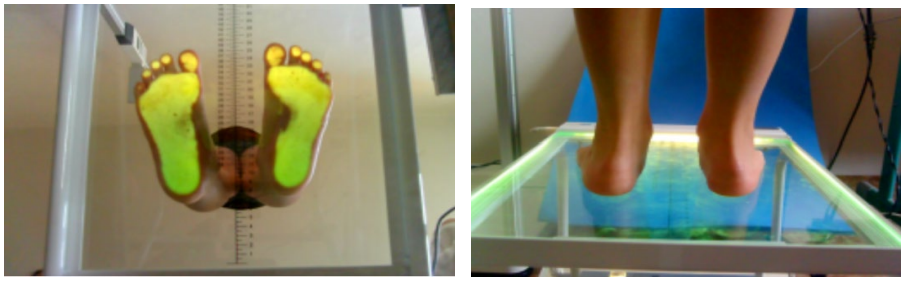
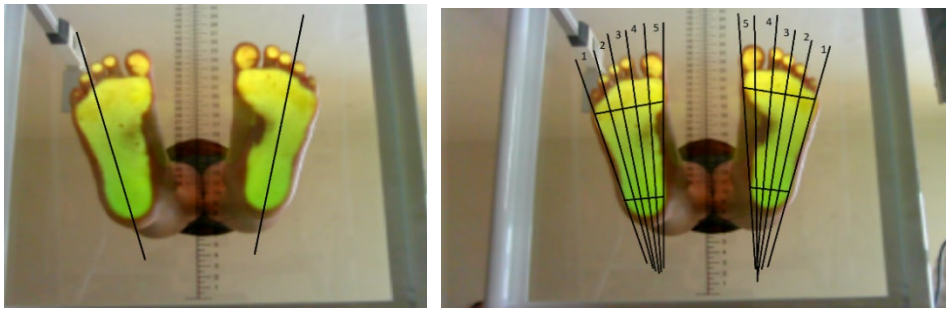


Figure 7 Final evaluation – Mayer line and segment evaluation method



DISCUSSION AND CONCLUSION

The presented case report shows that the influence of movement intervention and regimen measures can achieve correction without the need for orthopaedic insoles or other special shoe modifications. Its benefits are often underestimated in practice, but a necessary condition for their achievement is the motivation of the child and his/her parents for its regular and methodically correct implementation. If the exercises are not regularly performed and the regimen is not followed, their effect will diminish. Other influences, such as inappropriate sporting activity, may also negate the positive effect of the intervention.

The choice of an appropriate approach to flatfoot is based on a precise differential diagnosis. The musculoskeletal system should be viewed as a whole, and although a functional disorder may have a primary cause in a specific segment, it will always affect the function of the system as a whole. What is significant, therefore, is whether the flatfoot is primary or secondary and we approach its management accordingly. However, movement therapy is always part of the treatment approach, as are regimen measures. Ideally, they should also be part of primary prevention, which in our environment is usually carried out within the framework of health physical education.

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SLEEP QUALITY AND CHRONOTYPE DIFFERENCES IN CORRELATION TO THE BALANCE CONTROL IN JUVENILE ELITE SPEED SKATERS

Pavel KULMA

Abstract

Sleep is one of the main tools of regeneration, thanks to which physical and psychological parameters are restored and thus balances the negative impact of stress on the human body. The aim of the study is to analyze sleep quality and chronotype differences in correlation to the balance control in juvenile elite speed skaters. For the research survey it was selected 20 speed skaters (age average 17.6 years) from four elite Czech speed skating clubs. The following methods were used: content analysis, Life Rhythm and Sleep Questionnaire, University of Pittsburgh Questionnaire on Sleep Quality (PSQI), and a battery of functional balance tests. The measured data were analyzed by descriptive statistics using numerical and graphical methods, absolute and relative frequencies. The analysis of the results showed a positive correlation between the M-E score and the performance in the functional balance tests, and also showed a significant difference in the Bass test between men and women. Furthermore, it was found that men achieved a lower M-E score than women Deteriorated level of mental health was found in 10% of the examined speed skaters. The research survey thus showed that the global trend of today's society, which is a strong inclination to the evening typology, also applies to juvenile elite athletes, which is an undesirable phenomenon in terms of balance control and performance in speed skating. The results of the presented study may be useful for training focus of coaches or athletes.

Keywords

Balance skills, morning-evening chronotype, sleep quality, sleep preferences, speed skating.

1. INTRODUCTION

Sleep is one of the basic human needs for maintaining overall health and fitness. Research confirms that there is a relationship between sleep and food intake, short sleep duration can cause endocrine changes including lower leptin levels, glucose tolerance and insulin sensitivity. At the same time, there is an increase in the level of the hormone ghrelin, which has a direct effect on our feeling of hunger and our appetite. Some studies also confirm the connection between poor quality sleep and specific effects on behavior, such as a higher prediction of sedentary behavior. Food intake compared with a lower volume of physical activity (Cao, Zhu, Sun, Jing, 2019).

Physical activity right before going to bed can result in poor sleep quality. For example, athletes very often train to increase their performance and achieve the best possible results. By doing so, however, they expose themselves to the risk that the effect will manifest itself in the opposite way, and this can lead to overtraining syndrome. Studies have shown that poor sleep quality is also a symptom of overtraining. Therefore, we should pay sufficient attention to regeneration, when sleep is one of the best methods of regeneration (Zhao, Tian, Nie, Xu, Liu, 2012).

In the interests of the best possible performance in sports, high demands are placed on the athlete, and the level of stress also increases at the same time. From the point of view of biological and psychological adaptations, a certain level of stress is also desirable, but we should also keep in mind that there is a limit to everything and an excessive level of stress caused by high intensity, frequency, volume and duration of the training process can have the opposite effects, which are manifested negatively on human health and performance (Kellmann, Beckmann 2018).

Poor sleep quality even increases stress levels during the following day by 4.7 times compared

to people with good sleep quality (Herawati and Gayatri 2019). Kim et al. in his 2019 study observes the effects of sleep on stress levels. His results point to the fact that people who sleep an average of about 6 hours a day, which is much less than the National Sleep Foundation's recommendation, feel more stressed. Even young people who sleep less than 8 hours a night experience higher levels of stress compared to older people who sleep the same amount of time. A higher level of stress is therefore a strong predictor of poor sleep quality, therefore it is advisable to monitor and evaluate sleep parameters for athletes, which can indicate changes in states and possibly reveal the risk of changes (Biggins, Cahalan, Comyns, Purtill, O'Sullivan, 2018). Thanks to the great increase in electric lighting in the 20th century and the uncontrollable increase in the use of modern technology during the 21st century, for the first time in the history of development, humanity began to be exposed to bright and unnatural light during the night, either from screens or from street lights that shine for a long time after sunset. This entails, among other things, potential health risks. Our internal circadian rhythm can be disrupted, not only sleep can be affected, but it can also contribute to a number of other health complications (Šmotek, Kopřivová, Soš, 2016). The circadian rhythm is primarily controlled by the suprachiasmatic nuclei of the hypothalamus, which are called biological clocks. The circadian rhythm is aligned with the conditions in which a person lives. The main synchronizer is light. Information about light intensity is sent from the retina of the eye to the suprachiasmatic nuclei. Information about light conditions is further transmitted to the pineal gland. When it gets dark, the pineal gland starts to secrete the hormone melatonin, giving the body a signal that it's time to sleep. Conversely, when it is light, melatonin production decreases (Kassin, 2007). The state of consciousness is also dependent on a person's body temperature, the higher the temperature, the more the organism prepares for activity, and conversely, when the temperature drops, there is a period when the organism prepares for sleep. In addition to the already mentioned melatonin, the hormone cortisol also affects activity. On the contrary, it is necessary for the organism in the activity phase. Its secretion therefore increases in the second half of the night and reaches its maximum in the morning around 8 o'clock (Thirion, Callamel, 2013).

Speed skating is a sport with a long history. The International Skating Union (ISU) is actually the oldest international winter sports federation, founded in 1893. Long track speed skating (classic speed skating on a 400 m long oval, speed skating is further divided into short track speed skating, hockey stadium - short track) has been in the Olympics since 1924 and gives today's competitors the potential to win twelve gold medals at the Winter Olympics. Individual speed skating events can be classified into sprint (500 and 1000 m), middle distance (1500 m) and long distance (3000, 5000 and 10000 m). In addition, there are all-around championships where performances over four different distances are added together to determine the overall best performance. The aim of each of these competitions is to cover a given distance as quickly as possible, i.e. to achieve high mechanical performance and reduce frictional losses. Which characteristics determine the mechanical power achieved and the power lost due to frictional forces is an important topic of research in scientific literature. The special technique of speed skating makes this sport an interesting sport from a scientific point of view.

In speed skating, the total performance is the product of the leg's rebound work and the frequency of these rebounds. Work per rebound appeared relatively more important than frequency of rebounds, as faster and slower skaters differed mainly in rebound work but not rebound frequency. Although rebound frequency was not discriminating for performance, it primarily regulates skating speed (Orie, Hofman, De Konig, 2014).

Speed skating is itself a specific movement combining many different movement activities. The actual movement of skaters is a complex physiological process containing elements of dexterity as well as elements of speed, endurance and strength. The group of coordination abilities includes, for example: balance, reaction, rhythm, orientation in space, estimation, etc. All these abilities are an important and integral part of a successful speed skater. In practice, they are applied, for example, as follows: balance when skating on one leg,

reaction to the starting shot, rhythm of individual steps while riding, orientation on the track in relation to the start, goal, coach, etc., estimation of rotations, etc. To maintain balance in designated positions we use the body with the ability to balance, these abilities undoubtedly include a high level of the vestibular apparatus, visual senses and proprioreceptors. The ability to balance is best developed or trained using isometric exercises focused on postural muscles. Another of the methods used is exercise on balance surfaces, training of the vestibular apparatus and complex balance exercises (Měkota, Novosad, 2005).

2 AIM, HYPOTHESES

The aim of the presented study is to analyze the quality of sleep and sleep preferences of a monitored group of speed skaters with regard to the functional ability to manage balance and to compare the data obtained.

Based on the established goals, tasks and analysis of literary sources, the following hypotheses were formulated:

H1: Monitored men achieve a lower M-E score than women.

H2: Monitored women achieve better results in the Bass test.

3 METHODS

3.1 Subjects, Procedure

The research group consisted of 20 speed skaters in the age range of 14-30 years. Of this number, 12 speed skaters (8 women and 4 men in the age range 16-30 years) were at the top level as representatives, participating in the World Cup or World Championship. The rest of the research group consisted of 8 speed skaters (4 women and 4 men in the age range of 14-20 years) at the performance level, participating in international and national competitions. Measurements took place at sports camps. Including criteria were regular training of the subjects and absence of injury or illness.

Content analysis

For the presented study we used methods of analysis, synthesis, induction and deduction as well as causal and operational thinking. A synthesis of evidence and a critical and reproducible summary of the results of available publications on the subject were performed as well.

Diagnostics

For the purposes of the research investigation, a battery of the following diagnostic methods was compiled:

- **Life rhythms and sleep habits questionnaire** (Harada, Wada, Tsuji, Krejci, Kawada, Noji, Nakade, & Takeuchi, (2016) The questionnaire is developed and focused on the circadian rhythms and habits of athletes, including the sleep pattern. It consists of 33 questions, which are divided into 4 parts. The first part is focused on sleeping habits, the second part is focused on circadian typology with the calculation of the M-E score, the third part is focused on eating habits and the fourth part is focused on the level of mental health by calculating the M-Z score. The M-E score is calculated by the value of questions #14-20 with a maximum value of 28 points, and this indicates a distinctly morning type. The minimum number of points is 7 and indicates a distinctly evening type. Circadian typology is divided into 4 groups according to the values of the M-E score: 7-11 points strongly evening type, 12-17 points tending towards the evening type, 18-22 points tending towards the morning type and 23-28 points strongly morning type. The M-Z score is calculated by the value of questions #34-37 with a maximum value of 16 points, and this indicates a high level of mental health. Mental health is divided according to the values M-Z, the score is divided into 4 groups: 4-6 points low level of mental health, 7-9 points poor mental health, 10-12 points good level of mental health and 13-16 points excellent level of mental health.
- **Pittsburgh Sleep Quality Index (PSQI)** (Buysse, Reynolds, Monk, Berman, Kupfer, 1989). PSQI is a standardized test in the form of a questionnaire that monitors the overall level of sleep quality and life satisfaction of the subjects, as insomnia often

leads directly to its drastic deterioration. It focuses on the assessment of sleep in seven components: 1. sleep latency, 2. sleep duration, 3. usual sleep efficiency, 4. sleep disorders, 5. sleep quality, 6. use of sleep medication, 7. dysfunction caused by sleepiness. The questionnaire consists of 9 questions focused on sleep patterns during the past month.

- **Battery of balance tests** (Wood, 2008; Kulma, 2021):

  R1 - Balance board test (Wood, 2008), endurance on the balance board in the speed skating squat, speed skaters had their hands on their backs. Time was measured in seconds, and the test was terminated by an error in the form of the board touching the ground. According to Wood (2008), the evaluation of this test is 1 point for every 0.3s, the maximum is 100 points for 30s. The better the result, the better the balance skills.

  R2 - Bass test (Wood 2008), during this test the subject jumps on one leg to drawn marks that are precisely determined and 76.2 cm apart. The test taker must last 5 seconds without touching the ground with the other foot, then jump to the next mark. The test is terminated by loss of balance by touching the ground with the other foot, or by an imprecise jump to a mark that the foot does not completely cover. The evaluation of the test according to Wood (2008) is: subject jumped without error all 10 drawn marks - passed, subject did not jump all 10 drawn marks, or made a mistake - failed.

  R3 - Endurance in driving on one leg, in sliding skates on ice (Kulma 2021). The test was performed on both legs. In this test, the monitored speed skaters were tasked with picking up speed on their skates and from a designated mark to perform a one-leg ride down the slide "in a speed skating position" in order to ride as many seconds as possible. The test was terminated by touching the non-tested leg to the ice. The evaluation of this test was set at 1 point for 0.6s and 100 points for 60s. The better the result, the better the balance skills on the speed skates. Each speed skater has his own speed skates, which are specially designed and constructed for his body type, so as to minimize the difference in the friction surface of the skates on the ice and thus minimize the difference in speed between individual speed skaters depending on the body type, body weight, body height, or gender.

Statistics

The measured data were processed using statistical methods, especially descriptive statistics using numerical and graphic methods. Furthermore, absolute and relative frequencies were used to express the results. The Microsoft Excel 2016 editor was used, which has a library of statistical, mathematical and graphic functions for creating graphs, tables and basic descriptive methods such as average, minimum, maximum, etc.

4 RESULTS AND DISCUSSION

4.1 Results of PSQI

From the analysis of the PSQI questionnaire data, it follows that the monitored women from the group of speed skaters had an average point score of 4.8 points during the measured period. Which is below or equal to the threshold of 5 points, which means a good quality of sleep. Of the 12 monitored women, 4 women had a value above 5 points, which indicates a deteriorated quality of sleep. The men had an average measured PSQI value of 3.175, which indicates a good quality of sleep, of the 8 monitored men, 2 men had a worsened quality of sleep above the threshold of 5 points. In the comparison of the monitored group of speed skaters, men performed better with an average value of ≐ 3.18 points, compared to women who had an average value of 4.8 points.

The results also show that women went to bed earlier than men. The difference between the time to go to bed between men and women is 24 minutes in October. November 21 minutes, December 37 minutes, January 18 minutes and February 27 minutes. Here there is an increase in the difference with the largest measured value in December, then the lowest measured difference value in January and again an increase in the measured values in February.

These measured results do not correspond to the study by Buysse, Seteia, Krystal, Neubauer, Heald (2017), when the authors tested the quality of sleep, using the PSQI questionnaire, of adolescents at American universities with results of impaired sleep quality, mainly in men. According to authors Ledele (2018), Henriksen, Schinke, Moesch, McCann, Parham, Larsen, & Terry (2020), sleep problems are common among teenagers, mainly problems with falling asleep at late hours, or frequent awakenings from sleep.

4.2 Results of life rhythms and sleep patterns

To the monitored speed skaters were given a questionnaire on life rhythms and sleep patterns, from which points were added to determine circadian typology (M-E) using questions no. 14-20. Using questions 34-37, points were added up to determine a mental health score (M-H).

Table 1 Comparing men and women in the M-E score

M-E Type	Females	Males
Morning type	3	0
Tendency towards morning type	3	2
Tendency towards the evening type	3	5
Evening type	3	1

The largest representation of 40% is speed skaters with a tendency to gravitate towards the evening type, as the second group are speed skaters with a 25% tendency of the evening type. A little less 20% are represented by speed skaters as a distinctly early morning type. The smallest group of 15% are speed skaters as a distinctly early morning type.

The analyzed results of the circadian typology of monitored speed skaters comparing men and women show that more often women have a higher M-E score than men, and thus VP 1: Monitored men achieve a lower M-E score than women, is confirmed.

The analyzed results correspond to the current trend of the postmodern era (the so-called 24-hour society), that especially men in adolescence sleep less, go to bed longer and fall asleep more difficult, as also confirmed by studies by the authors Harada, Krejčí, Tilinger, Vacek, Wakamura, Kawada, Takeuchi (2016) and Harada, Wada, Tsuji, Krejci, Kawada, Noji, Nakade, Takeuchi (2016). According to Krejčí (2020), Mandelbaum, Harada, Takeuchi, Tsuji, Krejčí (2017) there is a positive influence between circadian typology and mental toughness. An athlete with a low level of mental health usually comes out as a distinctly evening type in the evaluation of the M-E score. A low level of mental health characterizes an athlete who tends to gravitate towards the evening type. A good level together with an excellent level of mental health represent rather or significantly morning types of people who are active mainly in the morning hours and are psychologically balanced.

4.3 Results of balance tests

In the battery of tests for measuring the balance abilities of the monitored speed skaters, the static measurement test, the balance board desk test, the dynamic measurement bass test, and the balance measurement in the slide, the balance test when riding on speed skates on one leg, were used.

Table 2 Overall results of the balance test battery (n=20, 8 men, 12 women)

Categories	Balance board desk	Bass test	Slide		Average
			left leg	right leg	
Females	86,02%	85,00%	92,42%	91,02%	88,62%
Males	85,05%	51,20%	88,03%	88,48%	78,19%
Representative	96,17%	100,00%	103,43%	102,25%	100,46%
National level	69,82%	12,00%	71,52%	71,63%	56,24%
Seniors	95,28%	100,00%	103,08%	102,12%	100,12%
Juniors	75,98%	32,00%	78,27%	77,90%	66,04%

From Table 2, it can be seen, comparing men and women that women were overall better in balance tests with 88.62% than men with 78.19%, by 10.43%. In the Balance board desk test, there was a minimal difference (0.97%) in percentage success between women 86.02% and men 85.05%. In the balance test, the skate slide test, women had a 92.42% success rate on their left leg and 91.02% success rate on their right leg compared to men who had 88.03% success rate on their left leg and 88.48% success rate on their right leg. As a result, women were better in the slide test on the left foot by 4.39% and on the right foot by 2.54% than men. In the Bass test, women had a success rate of 85%, while men had 51.20%. From which it follows that women were better in the Bass test by 32.80% than men. This significant difference confirms VP 2: Monitored women achieve better results in balance measurement in the Bass test.

In the comparison of performance groups of monitored speed skaters, the representative group with 100.46% was better in the battery of balance measurements by 44.22% than the performance group with 56.24%. In the Balance board desk test, the group of representatives had a success rate of 96.17% and was 26.35% better than the group of performance speed skaters with 69.82%. In the Bass test, the group of representatives had a success rate of 100%, which was 88% better than the group of performance speed skaters with a success rate of 12%. In the balance measurement of the one-leg slide test, the representative group had a result on the left leg of 103.43% and on the right leg 102.25%, compared to the performance group, which had a result on the left leg of 71.52% and on the right leg of 71.63%. The representative group was better on the left leg by 31.91% and by 30.62% on the right leg.

In the correlation of the measured M-E score, where women had a higher M-E score than men, it was shown in agreement with Littlehalese (2016) and in a battery of balance measurement tests, where women were better in all balance tests than men. Although all tested speed skaters write with their right hand, one would expect that the right leg would be the dominant one, it turned out that in most cases of measurement they performed better on the left leg. This may be due to the fact that speed skating is a sport where competitors orient themselves to the left and all turns on the oval are skated to the left. This places greater demands on the left side of the speed skater's body. Every speed skater has encountered the problem that the muscles on the left side of the body are more developed than those on the right side of the body. This fact could result in speed skaters performing better when testing the left leg.

In the diagnostic measurement, experience with balance in an older group of speed skaters, or a group of representatives, was also reflected, which is why the results between a group of older and younger speed skaters, or a group of representatives and a group of performance speed skaters, are so different.

5 CONCLUSIONS

The following hypotheses were verified within the study:

H1: Monitored men achieve a lower M-E score than women. It was verified.

H2: Monitored women achieve better results in the Bass test. It was verified.

Men's mental health scores have been shown to be related to their circadian typology. Only 12.5% of the monitored male speed skaters tended to be a significantly early morning type. Circadian typology was shown in correlation to the results of balance tests, where women were better in all tests than men. In the Bass test, women were 32.8% better than men.

On the basis of the interpreted results and the discussion, the following recommendations can be given for the practice of speed skating coaches: To have an educational effect, especially on young male speed skaters, so that they are motivated and consistently observe a regular circadian regime, i.e. to go to bed earlier (no later than 10 p.m.) and get up in the morning around 7 a.m. and to have regular balanced breakfasts followed by daylight hours for proper serotonin production. The functional balance abilities of speed skaters can be supported by a correctly set circadian regime, and overall their performance in speed skating can thus be favorably influenced.

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IMPROVING CONDITIONS FOR COMBINED STUDY

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Abstract

Combined study is demanding not only on the time management of the student, who has work and family obligations in addition to the study role. In addition, with increasing age, his cognitive condition decreases, especially in the area of memory, especially if he finished his previous studies several years ago and did not train his memory regularly. So asking students to learn by mechanical reproduction is often insurmountable for them. The school can help them to successfully complete their studies by improving the conditions in the form of specific teaching methods, easing the conditions for completing, for example, professional practice at their place of residence, and all this without reducing the quality of the studies.

Keywords

Teaching methods, combined studies, successful student, obstacles in studies.

1. INTRODUCTION

The question of how to improve the conditions for combined studies is not only raised by the founders and operators of various school institutions for secondary education. Some students are not only unable to solve the initial difficulties in managing their study obligations without help and needlessly end their studies prematurely. Combined study students have to combine their studies with work and family obligations, which is not easy for most of them. Among other things, the way of teaching by the school management can help, so that the student learns effectively according to the time and mental possibilities and abilities due to age or experience, and also often a long time since the last school attendance. Even from the point of view of the economy and the financial burden not only from the student's resources but also from the state, the option of not completing professional training is not desirable and it is important to find solutions so that the student is able to complete his studies while maintaining the necessary study requirements for the performance of the given profession. (1)

The Mills Higher School of Nursing, which was the subject of research aimed at tracing the reasons for not completing studies and thus the conditions for completing studies, allows its students only combined studies, and therefore this topic is key for the school, especially at the present time, when the pressure is not only in medical fields for higher education among non-medical workers. And since it is a private school, the degree of burden of higher tuition compared to state schools needs to be reflected in the offered method of study. Therefore, as part of the leadership of the Mills Higher School of Nursing, we decided to first monitor the reasons for not completing the combined study for individual students and then try to improve the conditions. The idea is to focus on improving the conditions so that the quality of studies is still maintained, taking into account the competences of graduates of individual fields. Students were included in the research — certified paramedic (CP), certified medical laboratory technician (DHLT), certified pharmaceutical assistant (DPhA). All are educated in accordance with Act No. 284/2018 Coll., amending Act No. 96/2004 Coll. on the conditions for obtaining and recognizing competence to perform non-medical health professions and to perform activities related to the provision of health care, as well as education according to Act No. 561/2004 Coll., on pre-school, primary, secondary, higher vocational and other education (Education Act), as amended, according to Decree No. 252/2019 Coll., which amends Decree No. 55/2011 Coll.,

establishing the activities of healthcare workers and other professional workers, Decree No. 470/2017 Coll., which amends Decree No. 39/2005 Coll., establishing the minimum requirements for educational programs to obtain professional competence to perform a non-medical healthcare profession and Decree No. 279/2016 amending Decree No. 10/2005 Coll., on higher professional education. (2,3)

The combined study is divided into winter and summer periods, in each period there are 5 weekend blocks of approx. 20 hours. The blocks are divided into a theoretical part at school and practical teaching at professional workplaces. It also includes a similar number of non-contact hours for self-study and the examination period. Not only practical teaching at clinical workplaces around the school, but also theoretical teaching at the school is mostly conceived as practical. It takes place in specialist classrooms or a school laboratory. The goal is to acquire variable nursing methods, skills for implementing a nursing plan and health care evaluation, to learn how to deal with healthy and sick clients, including their family members, and to work effectively as a team at workplaces according to the chosen field. For teaching and subsequent learning of new knowledge during professional practice or as part of self-study, teaching methods corresponding to adult tertiary education are recommended, and which lead to the required key, professional and other competencies in the students' future profession. (4,5,6)

In the 2016/2017 school year, with the new management of the individual study fields, alternative, interactive and student-activating methods were purposefully incorporated into the teaching and recommended during self-study. Since then, both the school and especially the students have preferred group teaching not only for mutual support and help between classmates, but also as training for future work teamwork. The teaching methods used in individual subjects are listed in the modules of the educational program, they are adapted not only to the nature of the subject, but especially to the application of acquired knowledge or skills according to competencies in the future profession. They also correspond to the mental maturity of students after experiences from previous vocational studies as well as from work experience. Seminars, laboratory exercises, solutions to model situations, discussions on problems, project methods, excursions and professional practice are included and very popular. (7)

Newly introduced, field-specific teaching methods were included in all monitored fields at Mills Higher vocational school. On the basis of previous independent research on the possibilities of increasing selected cognitive functions of students of individual fields during their combined studies, where it was proven (Muknšnáblová, 2021) that it is desirable to support a different cognitive function for each field, given the future work activities of graduates, based on the nature of the involvement of the selected cognitive functions mostly. For pharmacists, methods for improving (mechanical and logical) memory to increase the ability to retain information in precise wording were more frequently included. Therefore, when preparing medicines in pharmacies, follow exact compositions and procedures. Methods were used (classical and alternative, discussions and methods, e.g. snowball, outer and inner circle, etc.) supporting cognitive learning with a focus on the accuracy of knowledge. While paramedics, who must find a unique procedure for each patient in order to individually solve each emergency case due to the comorbidities of individual patients, and therefore use and connect the knowledge learned and find the optimal solution, they must especially train their thinking when learning. It is not enough for them to remember the learned procedure, but to draw up an individual therapeutic plan for each patient, and all this under time pressure. That is why rescuers practice logical thinking during their studies, e.g. by means of role-playing, brainstorming, demonstrations, and above all solving problem tasks immediately when acquiring new information, so that the process of proposing a solution to an exit situation becomes natural for them and does not increase the already heightened stressful situation. For laboratory technicians, it is primary to learn to be as attentive as possible to detailed differences, so that they are able to capture even small pathological variants, since many differences are not even enough to learn during studies, and therefore they use and strengthen specific attention during their work. The teaching takes place in the real

environment of clinical laboratories, e.g. in the form of a flying team with the possibility to monitor and evaluate an abundance of preparations and look for differences not only in the appearance of a specific biological material. (1)

2 RESEARCH OBJECTIVE AND METHODOLOGY

The aim of the research was not only to demonstrate an increase in the successful completion of studies after the introduction of specific teaching methods, but also to identify the most common reasons for not completing the combined studies and to look for possibilities on the part of the school to adapt the studies more to the current educational needs of the individual and thus society.

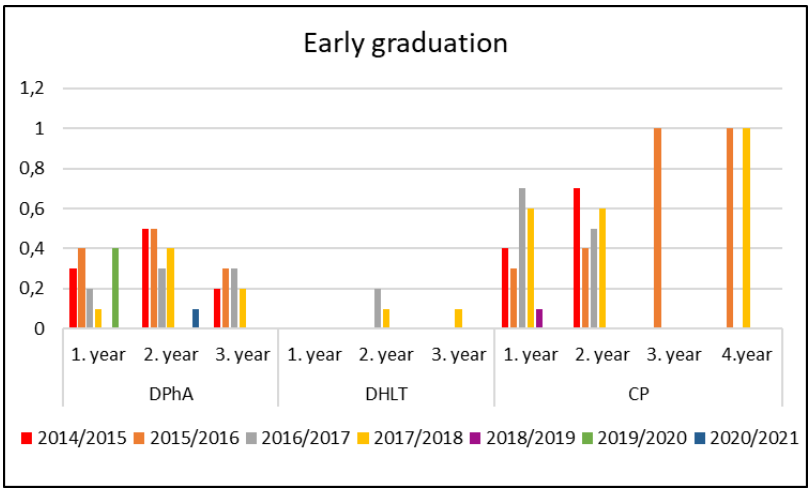
The research group of respondents included all students (n=551) of the Mills Čelákovice Higher Vocational School of Health from the fields of Diploma Pharmaceutical Assistant (DPhA), Diploma Medical Laboratory Technician (DHLT) and Diploma Medical Paramedic (CP) studying at this school between 2014 and 2021 The DHLT field was only introduced at the school in the 2015/2016 school year. Students could be admitted to the field of physical education at vocational schools (according to Act 96/2004 Coll. in the current wording) for the last time in the 2018/2019 school year, after which they can only gain eligibility after graduating from a university in the relevant field.

The resulting data were obtained in the form of individual semi-structured, non-standardized interviews with students who were not successful in their studies and requested to interrupt or end their studies.

3 RESULTS AND DISCUSSION

After 2016/2017, when new teaching methods were introduced, a reduction in the number of unsuccessful students who ended their studies early in the following year can already be seen in some grades. In the first year after the introduction of the methods, the reduction was not yet so striking, probably the pedagogues had not yet practiced all the possibilities and methods of teaching, and the school management was also fine-tuning the possibilities of connecting the methods and the acquired knowledge cross-subjectly, but in the following years the number of early terminations significantly decreased across all disciplines (by 40-100 %). Even when comparing the proportion of students finishing their studies early to the total number of students in a given year of a specific field, a significant decrease is evident.

Chart No. 1 Failure to complete studies - early termination

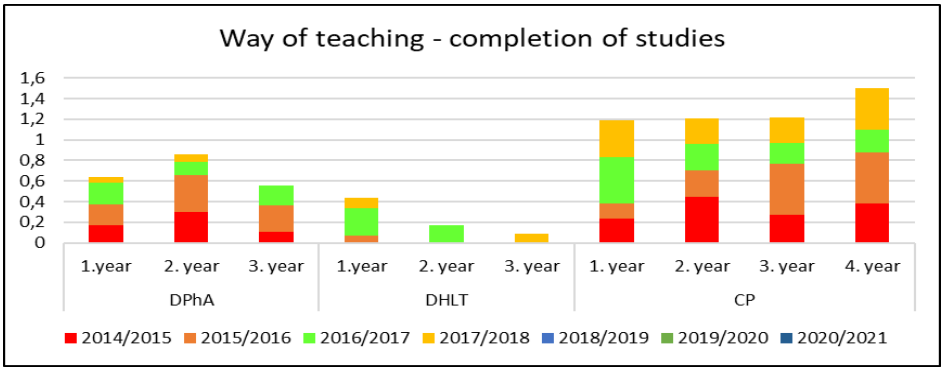


(Source: own processing)

Students who did not finish their studies and ended it prematurely without the possibility of returning, most often cited as the main reason for leaving the lack of time to study, not only for

attending school but especially for professional practice, which for non-medical health workers represents many hours (specifically DPhA - 600 hours, DHLT – 720 hours and CP – 1600 hours during the period of study). The second most common reason (especially in the lower grades) was a bad choice of study, when students only found out in the process that their idea of the essence of the work activities of a graduate of a specific field is different from reality and the field ceases to be attractive to them. This reason appeared most often right at the beginning of studies or after starting professional practice in the 2nd study period. The third frequently cited reason was an inadequate teaching method, insufficient understanding of school curriculum and the inability to learn a given subject through self-study. However, this reason was significantly reduced after the introduction of specific teaching methods for individual fields.

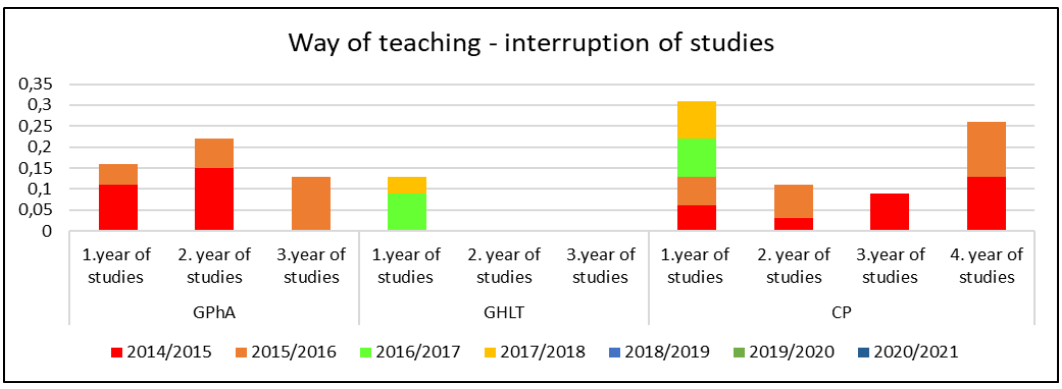
Chart No. 2 Inadequate form of teaching as a reason for early termination of studies



(Source: own processing)

Similar reasons for not completing their studies were given by students who decided to discontinue their studies for the time being. Again, the most common reason was lack of time, impossibility or inability to combine work, family and study obligations. Before starting their studies, not all students realized the necessity to devote themselves to studying not only once a month on the weekend at school, but significantly several times more during self-study or professional practice (which, in order to improve the study conditions, is allowed for students near their residence and at a time chosen by the student himself, according to his time possibilities, only with the condition of fulfilling the total number of hours and the nature of the workplace).

Chart No. 3 Inadequate form of teaching as a reason for not completing the grade and interrupting studies



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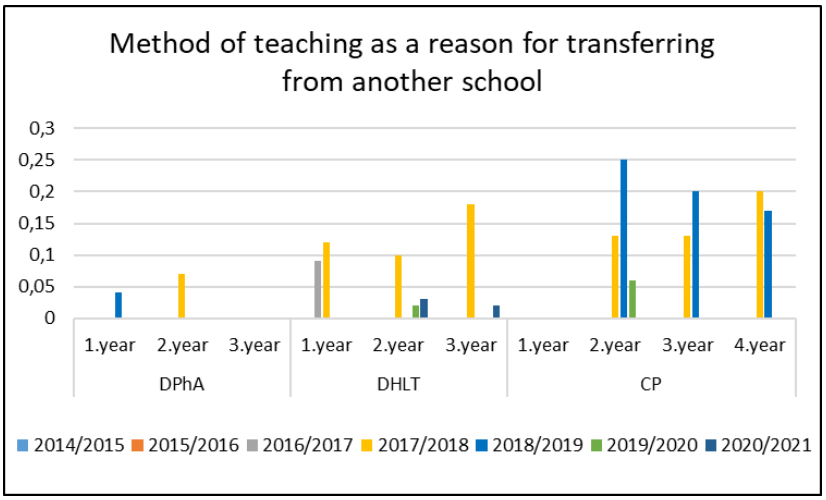
Another reason was again the unmanageability of the difficulty of studies, and just as with termination, so with the interruption of studies, the occurrence of this reason was significantly reduced after the introduction of specific methods, and on the contrary, the school saw an increase in the influx of students who transferred to Mills from other schools of the same field and reported as the reason for transferring to us is a different teaching method than the classic frontal form. Face-to-face teaching is not suitable for either younger or older students, just as it is not a welcome method for learning the connection of theoretical knowledge and practical skills, not only manual but also intellectual or social.

Even students who failed to finish the year in the regular or substitute term and chose the option to repeat the year, in the school years after the introduction of specific teaching methods, less often cited the inability to learn the required amount of material, lack of understanding of the given issue or other reasons related to the organization as the reason for not passing the year studies on the part of the school, but rather the lack of time to study for private reasons was to blame.

Chart No. 4 Method of teaching as a reason for transferring from another school



(Source: own processing)

Specific teaching methods adapted to the future competence of graduates are also a very common reason for a student to transfer from another higher vocational school or university. This justification appeared more often after their introduction in 2016/2017, but in 2019/2020 and 2020/2021, probably due to online teaching across all disciplines and schools, this reason appeared less often.

4 CONCLUSION

Older students, not only because of their age, but especially those who return to study after a longer break from their last study, experience great difficulties at the beginning of their studies connected with the change of regime, including not only contact teaching at school, but especially with combined studies, where learning is expected with most of the findings during self-study, back to being able to learn. However, as the current society requires, the emphasis is not so much on the mechanical, monologic reproduction of the learned material, but on the actual application in practice, during training during studies, at least on a theoretical level. That is, straight away learning what they will be able to apply. They can be supported by teaching instructions presented by the used teaching method, how to process new information while learning and be able to use it and connect it with previous knowledge and experience. It is innovative teaching methods with greater involvement of students that not only allow students of combined studies to learn the required material more easily, but

are also more attractive and fun for them, which keeps their attention longer, which strengthens the result of memory and the involvement of thinking. It is desirable to teach combined study students to use their previous study and, above all, work experience and thus try to eliminate the decreasing mental condition for learning new knowledge.

In teaching, it is important to use various activation methods to involve multiple sources of information reception, processing or fixation, which, in addition to creating the required skills, also especially increase student motivation and positively influence their relationship to learning and to a specific teaching module, which is often the case in a combined study very difficult for students in employment.

It is obvious that the method of teaching is, in addition to personal (family or work) matters with clearer time management, a very influential factor influencing not only the choice of school but also the assumption of completing the degree.

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