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CONTENT

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BREATHING AND RELAXATION EXERCISES AS PART OF A WELLNESS ROUTINE FOR MEN IN EXECUTIVE POSITIONS

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Abstract

Introduction*: The health state of male executives who are exposed to high levels of stress has yet to be thoroughly studied. Breathing and relaxation exercises could serve as an appropriate wellness routine to help them manage stressful conditions in the workplace as well as to prevent health problems related to an unhealthy lifestyle.*

Aim*: Our study comprises several phases and the objectives of each phase were chosen accordingly. In the first phase of our pilot study, we aimed to determine how effective a six-week exercise intervention program would be in promoting the mental and physical health of a selected group of men in executive positions. In the subsequent stages, we investigated how the programme served to educate these men and whether the participants continued an exercise routine over the next two years.*

Methodology*: Our research was based on a case-by-case evaluation of 10 men aged 35-55 years who work in executive top management positions. The men were asked to take part in several research surveys (8 in total) in a period of two years. After an initial assessment which included: an anamnestic examination and medical history, an assessment of posture and an anthropometric indicators, questionnaires, the men's so-called weak points were defined. On the basis of these weaknesses, a simple routine consisting of breathing and relaxation exercises was developed. The participants were instructed to performe this routine once a day for 15 minutes. The assessment methods included: czech questionnaire about manifestation of burnout syndrome "Inventář Projevů Syndromu Vyhoření" (IPSV), the Q8+1 self-esteem questionnaire ("Self-awareness"), an aspectual examination of body posture and anthropometric measurements (chest elasticity, wais/hip ratio index), the visual examinaton and anthropometric indicators measurements (chest elasticity, waist-hip ratio).*

These assessment were repeated several time the baseline assessment, during therapeutic programme; after the intervention; eight weeks after the intervention; and the followed up assessment two years after initiation of the study.

Results*: This pilot study indicate that after of the therapeutic program, there was an improvement in all assessed outcomes. Our research revealed that it is possible to attain improvements in psychological wellbeing as well as in some anthropometric parameters (chest elasticity) through targeted exercise intervention. However, almost all outcomes that showed improvement after completion of the program reverted to their original values after two years. None of the men involved in the study persisted with regular exercise, even though all of them acknowledged the positive impact the program had on their well-being.*

Keywords

breathing, exercise, health of men in executive positions, stress, wellness

INTRODUCTION

The aim of our study was to investigate the phenomenon of men exposed to high psychological stress load in the work area. The topic our study concerns a specific group of men focused on high performance, work efficiency and high level of knowledge.

These are professionals in the field of top management. Men who give peak performance in this can be compared to top athletes, only the performance they give is in a different setting. So the question is whether they have a team around them that cares about their fitness, as is the case with top athletes. These managers are decision makers in the management of businesses, institutions, individual companies, and in the management of government policy at the local or top level. They are the people who have the power to influence events that affect the whole of society. They are the personalities who manage the educational, legal, economic and social spheres and thus influence the present and future generations. In their publication, Veber et al. estimate the proportion of managers in the traditional industrial sector in Germany to be about 5 %, i.e. about 1.5 million people, while in modern sectors the number can reach up to 25 % (Veber, 2017). We do not have information about the proportion of managers in the Czech Republic, in general we can say that there is still a limited amount of research, information and resources about the health of male top management.

Top managers are men with both enormous potential to influence socieaty but with some individual risk factors, especially in the area of health. Based on our experience and expert consultations with physicians, we have compiled a set of these weak (critical) points.

These health „weaknesses“ we defined as:

- Lack of adequate physical activity, hypokinesia in general.
- High levels of psychological stress and its insufficient compensation.
- Increased tension of postural muscles of the neck and upper torso, muscle imbalances as a functional disorder
- Defective posture resulting from a sedentary lifestyle.
- Psychosomatic difficulties.
- Psychological disorders related to high stress loads
- The incidence of civilisation diseases already in the population around the age of 40, especially the clinical incidence of: pre-diabetes melitus II, cardiovascular disorders, high blood pressure, high cholesterol, deficience of vitamin D, overweight or even obesity and digestive problems.
- The worsening of an already treated condition (e.g. asthma) or the transition of acute health problems to chronicity.
- Overall lack of ability to relax physically and mentally on an individual level.

In the case of a top manager, this is mainly a mental burden, while in the normal working day of a manager there are many psychosocial stressors that affect both mental health and physical condition.

The stress response differs between the sexes: women have greater cortical and limbic activation (assessing a greater sense of threat, feeling more emotion), but at the same time women are better able to cope with existential stress by using better anti-stress strategies (findings supporting the biological role of women). In both sexes, exposure to stress results in reduced reproductive function and lower levels of sex hormones. The function of the reproductive system is also significantly negatively affected by psychosocial stress, with greater sensitivity to psychosocial stress prevailing in men's reproductive system, and feelings of frustration and inferiority are strong stressors for men (Bartůňková, 2010).

Positive effect of breathing exercise

In our study, we exploited the potential of breathing exercises in an attempt to influence at least some of the aforementioned „weaknesses“. Breathing movements stimulate the nervous system

and at the same time stabilize posture (Kolář, 2007). The correct way of breathing has a positive effect on the function of internal organs. Breathing movements (inhalation, exhalation) act as a massage, which improves the function of internal organs; with the help of conscious breathing it is possible to interfere with the autonomic nervous system, to influence the state of mind 170and thus affect the health of the whole organism. For these reasons, breathing exercises are used as a therapeutic method to treat postural disorders and to influence the mind (Véle, 2012). By relaxing and breathing properly, we can reduce physical tension in the chest, shoulders and neck, areas where tension accumulates due to stress. Mental relaxation is accompanied by physical relaxation, and the effects are thus manifested not only in a decrease in muscle tension but also in a decrease in breathing and heart rate, a decrease in blood pressure, changes in metabolism, and a decrease in the secretion of certain adrenal and thyroid hormones (Stackeová, 2014). Krejčí states that relaxation and concentration techniques reduce stress and mental tension, and help to develop self-esteem and satisfaction (Krejčí, 2011).

STUDY AIM

This pilot study had several phases and the objectives of each phase were chosen accordingly. In the first phase, the aim of our pilot study was to determine how effective a six-week exercise intervention programme would be in promoting mental and physical health in a group of senior managers. In the next stages of the study, we investigated the impact of the intervention programme on education level (about psychological health) and whether the probands continued to exercise over the next two years.

Our main aim therefore was to evaluate wheather the therapeutic programme called „Vital Management“ will influence psychological wellbeing and changes in body posture. The secondary aims include evaluate if any changes after completing programme will persist, and if the participants will continue in breathing exercise routine.

METHODOLOGY

Our sample consisted of a group of 10 men in top management positions aged 35-55 years. They have worked in various areas of senior management, including business, politics, the judiciary and education. Participating managers were of Czech or other European nationality, and the entry criterion for the study was the place of work in the Czech Republic, most often in Prague and its surroundings. Positions held included: CEO of a multinational business company (CEO, CFO, VP for the area), owner or CEO of a law company, senior politician, director of a state organisation, university teacher in a management position. The characteristic feature of the study participants was a person exposed to high stress in the work domain, a person with high executive potential and at the same time with weaknesses (risk factors) in the health domain.

A necessary condition for participation in the study was the participants' motivation for the project and their interest in their own health. Originaly twelve persons were enrolled to this pilot study. Unfortunatelly two probands, did not complete the project due to health complications or personal reasons. They were therefore excluded from the study.

Examination within the study

The pilot study (including follow up assessment) lasting for 2 years (from 04/2021 to 06/2023). During the study there were 8 indivudual meeting of participant with study assistent (first meeting was only explaining the study

purpuse and study protocol). Participant were assessed before exercise program, after completing program (next week after completing) and with 2 follow-ups (8 weeks after program and 2 years after program completing).

Individual medical and stress history

Both guided and unguided interviews were conducted at the beginning of the study. The researcher prepared a set of interview questions that included all types of research questions (closed, semi-closed, open-ended) to fully assess their health status and stress level.

Questionnaire used

The Czech questionnaire about manifestation of burnout syndrome "Inventář Projevů Syndromu Vyhoření" (IPSV), questionnaire Inventory of Manifestations of Burnout Syndrome with 24 questions (Tošnerová & Tošner 2002. [online] based on Hennig and Keller 1996) The results of the questionnaire were converted into percentages.

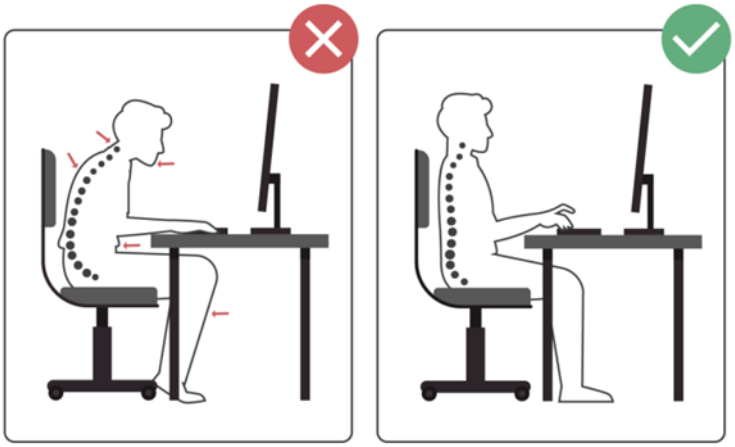
Postural assessment

Furthermore, we used the aspection to evaluate the sitting posture and the musculoskeletal system in this working position of each individual subject.

To assess the current postural status, 4 critical postural points were identified (Figure 1), or points whose weakening or overuse results in muscular imbalance and incorrect posture:

a) head forward displacement and associated hyperlordosis in the cervical spine, increased tension in the neck and neck muscles,
b) increased thoracic kyphosis, loosening of the interscapular muscles,
c) tight chest, pressure on abdominal organs, loose abdominal musculature, unconsolidated muscular centre of the body,
d) poor positioning of the lower limbs and feet (feet not supported by the ground, knees or toes are rotated inwards or crossed).

Figure 1 - Postural assessment with criticial points



Anthropometric examination

Two anthropometric indices were selected for this study:

a) Waist-Hip Ratio (WHR) index,
Waist circumference was measured at the level of the umbilicus in the horizontal plane, and hip circumference was measured at the level of the greater trochanters. According to WHO recommendations the normal values for men are considered 0,9 and less.

b) chest elasticity
The chest elasticity (flexibility in maximal respiratory movements) was measured during maximal effortful

inspiration and expiration. The chest circumference was measured at the level of the mesosternal point (4th intercostal space) and posteriorly under the inferior angles of the shoulder blades. Measurements were taken 3 times during maximal inspiration and immediately after maximal expiration. The difference between the circuits in inspiration and expiration determined the elasticity of the chest. We measured in centimeters with rounding to the nearest 0.5 cm (Haladová & Nechvátalová 2010).

Intervention breathing programme

An intervention 6-week program called "Vital Management" was designed for the study, consisting of breathing and relaxation exercises. The intervention program was developed based on the experience of a physiotherapist who is also a certified Pilates instructor, as well as the knowledge of the stress response consulted by a professor of endocrinology. The participants were instructed to perform the exercise once a day, for at least 15 minutes. Due to the time demands of the participants' work programme, only minimal time was chosen. Exercise compliance was considered to be 100 % with 6-7 units exercised per week. The program included instruction on correct posture and practice of individual breathing and relaxation exercises. Each participant could then perform the exercises on his/her own or use the video recording as a guide. The video recording created by the researcher (practitioner) was available on the YouTube platform. All videos are uploaded in Czech and English versions. The programme uses the Theraband exercise equipment. Before each stage of the program, each participant was individually shown the exercises. The exercises have been slightly modified as the stages have progressed. More details about program in Table 1.

Table 1 Vital Management program

	Phase 1 (Week 1 and 2)	**Phase II (Week 3 and 4)**	**Phase III (Week 5 and 6)**
Introduction	Calming, quieting, being here and now		
Posture adjustment	Adjustment of foot support, position of knees, buttocks, correction of posture, trunk, shoulders and head		
Focusing on own body and breathing	Awareness of your own breath, its rhythm and depth. Taking a deep breath into the abdominal area.	Awareness of your own breath, its rhythm and depth. Deep breathing into the abdomen and then into the chest, expanding the chest in all directions.	Awareness of your own breath, its rhythm and depth. Deep breathing into the abdomen and then into the chest, expanding the chest in all directions.
Compensatory exercise	a) rolling the spine into a forward bend b) shoulder circling c) breathing into the lower ribs using a theraband	a) rolling the spine into a forward bend b) shoulder circles combined with chest movements, emphasis on stretching c) breathing into the lower ribs using a theraband d) straightening arms into a V	a) rolling the spine into a forward bend b) shoulder circles combined with chest movements, emphasis on stretching c) extended arm leads the chest into rotation using theraband d) straightening of the arms and subsequent sideways bending
Final part	Final relaxation, calming the breath, relaxation of shoulders, arms, hands. Return to normal activities.		

RESULTS

The demographic characteristic of participants is displayed in Table 2. All probands experienced a reduction in subjective perceived stress levels immediately after exercise program. From this questionnaire „Inventář projevů syndromu vyhoření“, the mean baseline value of stress 33.3 %. The most highlighted areas were marked: emotional, physical and social. The values obtained from the questionnaire immediately the intervention showed a reduction in the overall stress level by an average of 6 %. They perceived reducing stress in physical area. More details are described in Table 3.

Table 2 – Demographic characteristic of participants

Participant	Age (years)	Weight (kg)	Height (cm)	Subjective perceive work load (%)	Subjective level of stress (%)	Physical activity (PA)	Experience with some breathing exercise
1	45	77	175	120	80	Runners for long distances	no
2	46	110	185	130	80	Low level of PA	no
3	55	89	187	100	100	Only on weekend-cycling	no
4	46	82	183	100	90	Only during summer time swimming	In childhood breathing exercise for astma
5	37	84,5	170	80	85	3 times weekly exercise in fitnes centre	In childhood breathing exercise for astma
6	48	120	179	80	60	Low level of PA	no
7	45	98	198	90	70	Low level of PA	no
8	50	102	186	90	70	2-3 times weekly aerobic exercise	Few years ago during power yoga lessons
9	44	103	173	100	80	Low level of PA	no
10	44	105	183	150	90	Low level of PA	no

Table 3 – Assessed outcomes

Parameter	Baseline assessment Mean (SD)	After program Mean (SD)	8-weeks follow up Mean (SD)	2-years follow up Mean (SD)
Perceived stress level (risk of burnout syndrome) (in %)	33,8 (14,3)	27,9 (15,5)	-	31,4 (18,6)
Corrected sitting posture (in %)	35 (30)	95 (15)	75 (23,5)	58,3 (28,8)
Wais-hip ratio	0,99 (0,07)	1,04 (0,16)	0,99 (0,07)	0,98 (0,08)
Thorax respiratory excursion (cm)	2,7 (1,5)	5,3 (2,7)	4,5 (2,1)	3,7 (1,9)

At the baseline assessment, we found poor sitting posture in all participants. After the exercise intervention, all participants were able to improve their sitting posture.

Correct posture was achieved in 90 % of participants. Unfortunately, 2 years after the intervention, none of the probands (0 probands out of 10) were able to maintain 100% of the principles of correct sitting posture.

After completing a 6-week breathing exercise program, chest mobility improved in all participants. No major changes in the wais/hip ratio were observed. More details in Table 4.

The use of the video recording proved beneficial, with 80 % of participants using the video recording for regular exercise. The recording acted as both a guide to the exercise and according to 70 % of the probands the voice of the guide acted as a tool for relaxation and calming. The total exercise adherence during program was 92 %. However, none of the participants continued to exercise after the study. Although in personal interviews most of them reported that they occasionally remembered and performed some of the breathing exercises, none of them practiced the entire recommended exercise routine.

DISCUSSION

In our study looking at the effect of breathing exercise, we evaluated several parameteres:

a) Thorax respiratory movement excursions: Research shows that men engage the abdominal area more during maximal breathing (called diaphragmatic breathing). According to other authors, chest respiratory excursions tends to be 20 % greater in men than in women. (Debouche et al., 2016) In healthy individuals, chest respiratory movements are within the normal range of 4-7 cm (Debouche et al., 2016; Reddy et al., 2019). Respiratory amplitude below 2.5 cm is considered pathological and indicates reduced chest development in that area (Neumannová & Kolek, 2018). This simple evaluated parameter of chest respiratory became a motivator for exercisers during our study. Participants immediately saw the manifestations of exercise and his efforts from the measurement results. This parameter showed visible result, and for the managers, whose work is for the most part focused on immediate results, was able to immediately evaluate his effort and the effects of the exercise. At the same time, the indicator very accurately reflected the proband's current state - if the proband was experiencing a busy work week or exercising less, the chest development measure made this very apparent. Interestingly, despite this fact and the almost immediate positive effect of breathing exercise on chest elasticity, none of the exercise probands persisted in practicing exercise routine two years after the first intervention.

b) The second anthropometric parameter that we evaluated was the WHR index - the central obesity index provides an easy way to determine the level of risk in relation to cardiovascular disease and metabolic complications of the body. The reference values of the WHR index according to the WHO are norm: 0.9 or less for men; 0.85 or less for women, risk: 1.0 or higher for both men and women, increasing the risk of heart disease and other problems associated with overweight, obesity. (WHO, 2008) The WHR value in our probands was in the risk level in 60 %, and in the norm in 40 %. The percentage distribution of WHR remained the same after two years.

c) Sitting posture and ability to maintain corrected upright posture.
All participants were able to change in improve their sitting posture after completing the breathing program. Our pilot study has confirmed that, as Véle states, changing posture and relearning existing patterns is a complex

process that requires attention to correct breathing and regular exercise (Véle, 2012). We found that during consistent exercise and with focus on breathing and posture, positive results could be achieved in as little as 6 weeks; however, once our participans lost this focus and did not intentionally work on it, they reverted back to previous pathological patterns.

d) Psychological outcome
Despite the fact that all probands reported improvements in the psychological area, which was confirmed both by their own subjective assessment and was documented by the questionnaire survey (Czech version of risk of burnout syndrome questionnaire) - decrease in stress susceptibility by mean of 6 %), we have assumed that the element of correct breathing and calming was observed to be difficult to implement at least in the first third of the intervention. In particular, the calming element. The majority of probands described that they considered the program as the next task on their list, albeit meant as a task to "work on themselves, for themselves". A performance-oriented manager needs time and practice to achieve a state of relaxation. This finding is entirely consistent with authors who states that relaxation needs to be taught. (Stackeová, 2011). Relaxation has a close relationship with self-knowledge. Calming, quieting and adjusting oneself from a position of performance to a position of relaxation is an extended learning, practicing and training process for the "untrained" individual.

The absence of a control group and the lack of instrumental measurements can be considered a limitation of this pilot study. Due to the enormous workload of the participants (and thus their low willingness and ability to attend the examination anywhere. However, even all examinations took place in their office to minimize time loss and the need to go anywhere) this would not have been possible. In addition, this pilot study took place during a period of pandemic restrictions.

CONCLUSION

Our pilot study showed that with targeted breathing intervention, improvements were observed in some areas. Subjective perceived physical improvemen were reported by participants almost immediately after exercise. To perceive some psychological relief he participants have to repeat the breathing exercise programe for several weeks. At the same time, the psychological relief was perceived by some participants for only a short period of time immediately after the exercise. However, regular exercise is needed to maintain the condition. It has also been confirmed that fixing the correct posture is a long-term process, requiring continuous focused work together with conscious breathing techniques.

Furthermore, we can assume that all the outcomes that were improved after the intervention programme returned to their baseline values after two years. None of the managers who participated were able to maintain regular practice of the entire routine, even though all felt the positive impact of the program on their body. However, most of the participants did practice some elements of breathing exercise occasionally.

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GROWTH HORMONE AS A CONDITION FOR HEALTHY DEVELOPMENT

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Abstract

Growth hormone is produced by the endocrine system from early intrauterine development, because without it there would be no tissue development and healthy development of the human organism. Production changes alternately with age, and if it is insufficient, it can manifest itself not only in insufficient body height, but also metabolically, which will affect the overall state of health. This review study points to insufficient natural production, which can be monitored prenatally, followed by accurate dynamic laboratory tests, and early replacement home injection treatment can be initiated in order to eliminate the symptoms of limited biological secretion of growth hormone.

Keywords

growth hormone, organism development, somatotropin

INTRODUCTION

Hormones are biologically active substances, carrying important information for the activity of individual tissues. Their function is to support or, conversely, dampen the activity of organs or the entire organism. Hormones are produced by the endocrine system, which in its endocrine glands produces hormones that are carried directly into the blood, which then distributes them throughout the body to the target site of action. The endocrine system is connected to the nervous system, to which it is subordinate. The synthesis of somatotropin (growth hormone) is ensured by the pituitary gland, specifically adenohypophyseal somatotropes. Other hormones are also produced in the adenohypophysis, e.g. adrenocorticotropic, thyrotropic, gonadotropic or melano-stimulating.

Growth hormone production

The regulation of somatotropin secretion is controlled by the hormone GHRH (growth hormone-releasing hormone), which can be demonstrated in the human hypothalamus between the 18th and 29th week of intrauterine development, specifically, it is produced in the arcuate nucleus of the hypothalamus. As stated by Bengi (2012), several neuroendocrine neurons can be found in this nucleus. However, GHRH, also known as somatoliberin, is primary for growth. Somatoliberin has a stimulating function, the opposite is somatostatin (growth hormone inhibiting hormone, GIH), which has an inhibitory effect. Somatoliberin and somatostatin influence the regulation of somatotropin secretion. After somatotropin enters the bloodstream, it is bound to a carrier protein called growth hormone-binding protein, or GHBP for short.

The action of somatotropin is closely related to two peptides (IGF 1 and IGF 2), which are part of the physiological control of growth, metabolism and cell survival. They are insulin-like factors. IGF 1 is a polypeptide similar to proinsulin, composed of 70 amino acids. Its action in the body is focused primarily on cell growth and differentiation, IGF 1 ensures the progression of the cell from the G1 phase to the next phases of the cell cycle. IGF 1 also has the ability to delay cell death. It

has an effect on the metabolism of virtually all essential nutrients. IGF2 is a peptide formed by 67 amino acids. It increases during early development and then decreases during adulthood. It plays an important role in the regulation of cell growth, differentiation and metabolism the ability to act on adipose tissue, liver and skeletal muscles. In the liver, it suppresses glucose production and increases glycogen synthesis. An important difference between IGF 1 and IGF 2 is the time when they are applied to human growth. While IGF 1 acts more in the postnatal period, IGF 2 is mainly applied in the prenatal period. Both peptides circulate in the blood, they are bound to specific binding proteins called IGFBP (insulin-like growth factor binding proteins, whose synthesis takes place mainly in the liver.

Human growth is ensured by somatotropin through somatomedins, which stimulate the growth plates of long and short bones, thereby ensuring bone growth to length (in childhood before ossification of the growth cartilages after puberty). According to Bláhová & Fencl & Lebl (2019), another important task for growth is the direct stimulation of division and multiplication of cartilage chondrocytes. Therefore, somatotropin is also used in treatment to improve the patient's body height and strengthen muscles.

The effect of growth hormone is also proven in various metabolic processes. An example is the ability to increase the release of glycogen from the liver, thereby affecting carbohydrate metabolism. In children with Prader-Willi syndrome, its effect on the reduction of body fat and on the better development of muscle mass is used, thanks to which subsequent psychomotor development takes place better. But the growth of the organism is not only influenced by the growth hormone, circumstances such as: diet (sufficient amino acids as building blocks for building the organism, optimal supply of vitamin D[1]), genetic predisposition (homeobox genes, represented by the SHOX gene, if abnormalities occur) also come to the fore. there are organ defects, Madelung's deformity (wrist deformity), goth palate, shortening of the length of long bones or noticeable muscle enlargement), chronic diseases (chronic intestinal inflammation with impaired absorption of nutrients, celiac disease or food intake disorders, chronic kidney disease), the course of pregnancy (lifestyle of the mother, intrauterine infection, duration and course of pregnancy and childbirth), other hormonal factors, for example thyroid hormones (triiodothyronine, thyroxine), sex hormones (gestagens, androgens), and hormones from the adrenal cortex (corticosteroids).

Monitoring the effect of growth hormone

The overview study shows that the growth of each child is monitored according to the prescribed growth curve, which is one of the indicators of the successful development of an individual, taking into account the connection between physical growth and mental health, especially in the post-pubertal period. The pediatrician is responsible for monitoring the growth curve during regular preventive examinations. The data is recorded in the child's vaccination card and plotted in so-called percentile graphs. These charts are a tool for comparing a child's growth with values common in the entire population aged 0-18 years. flight. It is important to pay attention to the gender difference. The resulting height percentile

[1] Vitamin D is obtained from sunlight, diet or vitamin supplements. Its effect is crucial for proper growth, because it has the ability to support the absorption of calcium and phosphorus in the intestine, which helps the formation and growth of bones. Sufficient daily intake of vit. D is 600-800 units, individually according to the current blood level. Its active form is calcitriol, which ensures the differentiation and mineralization of newly growing bone. The most common problems include its insufficient intake or resistance to it.

value means that a given percentage of children achieve the same or lower result. The 50th percentile corresponds to the mean value of the monitored physical property. We always measure infants and toddlers lying down using a so-called body meter. We use the stadiometer for children who are already standing on their own, which is around 2 years old.

The medical field - auxology - deals with the ICP growth model. Loosely translated from the Greek auxó= growth. The founder of the ICP model is the Swedish auxologist Johan Karlberg, who divided the mouth curve into three components that overlap and add up. ICP is an abbreviation - infancy, childhood and puberty. Each of these periods is controlled hormonally differently. The I-infancy period smoothly follows fetal growth, when insulin-like growth factors (IGF) play a significant role in development, but IGF 1 the most. Between the first and second year of life, the onset of the C-childhood period begins, which is dominantly controlled by growth hormone, which acts through the liver to stimulate the formation of somatomedins, which will allow the hormone to act on the tissues. The C period of the model lasts until the end of body growth. The last component is the P period - Puberty is characterized by a large action of sex hormones, when individuals reach sexual maturity and gain the last 15% of their final height. This model is also referred to as a sandwich model and is recognized worldwide. It is another indicator of a possible problem with the child's development.

Thanks to knowledge about the growth rate, or the so-called skeletal linear growth, we know when growth ends and when to stop the already synthesized growth hormone. Growth rate peaks before the juvenile reaches full sexual maturity. Then it gradually decreases. It is therefore estimated that roughly 80% of growth occurs before puberty. An important term is the so-called growth spurt. A spurt is a term for a period of sudden acceleration of a child's growth. When it comes to the pubertal spurt, the child should reach their final adult height.

The field of auxology deals with the possibilities of proving the specific biological maturation (age, stage of development or growth) of an individual. This is done by assessing dental age, sexual maturity, anthropometric characteristics (height, weight, length, head circumference...) and bone age. Bone age indicates the state of maturity of the skeleton, indicating the degree of maturity of the skeleton, determined by the degree of ossification. It is not a measurement of bone length, but the conversion of cartilage to bone. According to Igaz (2022), an auxologist is able to evaluate the degree of maturation from an x-ray of the wrist and distal forearm. Knowledge of the location of ossification centers is important for his work. For a right-handed person, the left hand is always X-rayed and vice versa. It is advantageous because of the large number of ossification centers in a small area that is easily accessible. When examining an X-ray image, an auxologist is able to detect various abnormalities in addition to the state of skeletal maturity and also has the opportunity to evaluate the width of the epiphyseal fissures. The result of the auxologist's work is information on a relatively accurate prediction of the final height in adulthood.

It also assesses whether the child's height is small or large in the family. Important information for the doctor is specifically the assessment of the closure of the growth fissures. Once the complete closure of the growth cracks is detected, it is no longer effective to administer the growth hormone, the child will no longer grow even despite its effects.

Among the current methods for evaluating bone age in our country and in the world,

the following are used: Greulich-Pyle (G-P) methods, Tanner Whitehouse methods (TW1, TW2, TW3) The G-P method is referred to as a faster method, but at the same time less accurate. In the 1950s, anthropologist William Bill Greulich and Stanford Anatomy Institute researcher Mr. Idell Pyle established the Radiological Atlas of Hand and Wrist Skeletal Development. The G-P method is therefore based on comparing images from the atlas and the image of the patient that is most similar to it. The Tanner and Whitehouse (TW) methods are based on the assessment of the shape and size of the ossification centers of the 20 bones of the hand and distal forearm and their relationship with neighboring bones. The approach is done very carefully bone by bone. Each bone is assigned 8-9 stages of maturity that the bone passes through.

When evaluating sexual maturation and puberty as an indicator of phase and growth potential, the proportionality of the figure, the child's psychological state, the state of nutrition, physical deviations and the development of secondary sexual characteristics are monitored. The doctor evaluates the degree of development of secondary sexual characteristics according to Tanner. It is a scale of physical development of children, adolescents and adults. In girls, the development of the mammary glands (mamma) is evaluated at M1-M5, the scale of pubic hair is marked P1-P5, and in girls and boys, the development of the genitals is also evaluated at G1-G5. The markings are from 1 to 5, with 1 being the stage of the child where no signs of pubertal development are evident. Stage 5 corresponds to a fully developed adult. For boys, an orchidometer is required for examination. It is a tool used for an indicative examination of the volume of the testicles. The development of the testicles is an important milestone for boys, it is the first sign of their puberty. At around 11.5 years of age, the testicles usually begin to enlarge. The first sign of puberty in girls is the enlargement of the mammary glands. It usually starts at the age of 11, and menarche starts at an average of 12.5 years.

Intrauterine growth restriction (IUGR) is supported by diagnostics using ultrasound, on which the fetus is characterized by a significant delay in growth, or a deviation from the so-called genetic growth rate. This serious situation can occur from the very beginning of pregnancy or it can begin to manifest itself only after a few months. That is why ultrasound examinations in the gynecologist's office are very important. The cause of IUGR can be inappropriate lifestyle of the mother (nutrition, drug abuse), age and height of both parents, pregnancy infection and chronic diseases, gestosis, various anomalies of the uterus, insufficiency of the placenta, e.g. as a result of preeclampsia, gestational diabetes or hypertension. In the event of insufficient placental function in an attempt to reduce metabolic demands, the movement of the fetus is stopped, as well as its growth. If a genetic or otherwise caused congenital growth disorder is suspected, a karyotype examination using cordocentesis (puncture of the umbilical cord) is possible.

Among the most frequently used examination methods for the diagnosis of growth disorders, the examination of blood parameters is also used - blood count, liver and kidney function, IGF-1 in urine, erythrocyte sedimentation, CRP, celiac disease antibodies, thyrostimulating hormone, free thyroxine, genetic examination - karyotype, SHOX gene and, last but not least, brain and pituitary MRI.

The effects of growth hormone are mainly mediated by the IGF 1 factor, which has a constant level in the serum. Therefore, if it is found during blood sampling that the child has significantly lower IGF 1 values, the production of STH is determined in more detail using dynamic or functional

tests. The level of IGF 1 is found to increase after the administration of growth hormone, so it is assumed that the levels of IGF 1 reflect the levels of growth hormone in the blood. Tests are divided into stimulatory and inhibitory.

Stimulating influences and substances include stress, hypoglycemia, arginine, dopamine and food intake. The opposite is the effect that inhibits secretion, among them is the action of glucose. Clonidine, arginine or insulin tests are most often used to determine STH levels. The clonidine test for detecting growth hormone secretion is performed on an outpatient basis, fasting and in bed. First, blood is collected before stimulation, then clonidine chloride is given by mouth in the form of a clear solution, and then blood is collected again at 30, 60 and 90 minutes of the test. The insulin tolerance test is also an invasive examination in which insulin is administered into the venous circulation, thereby inducing hypoglycemia, during which the secretion of growth hormone increases. The arginine test for growth hormone stimulation in the pituitary gland is also performed on an outpatient basis, fasting and at bed rest. Before starting the test, the child is examined by a doctor, blood pressure is measured and an EKG is recorded. After the initial blood sampling and determination of the blood sugar level, the test substance Arginine chloride 21% (the dosage is based on the patient's weight) is administered as an intravenous infusion for 30 minutes, followed by further blood sampling after the end of the infusion at regular 30-minute intervals for 90 minutes.

Growth hormone therapy

If the pituitary gland is unable to produce enough growth hormone, there is a possibility of treatment with its synthesized form. Currently, the biosynthetic hormone is produced by the recombinant DNA method. Wright (2011) describes a process where initially there was an effort to obtain the necessary material from animal pituitary glands. It was soon discovered that it does not affect humans. In 1957, the hormone was first used when it was working properly. The manufacturing process at the time was based on extracts from cadaveric human pituitary glands. Therefore, the product was called cadaver-GH. An unfortunate milestone in the development of a drug against short stature was the death of a patient. Most likely, there was an error in the processing of the material when it was contaminated. Subsequently, a prion disease called Creutzfeldt-Jakob disease began to develop in the organism. Unfortunately, this is a disease for which the causal treatment is unknown and always ends in death. An important turning point in the development of growth hormone treatment occurred in 1985.

Recombinant preparations have become available, which is artificially synthesized DNA that is created by inserting the entire gene or a certain part of it into the genome of another organism. The basis is the use of an organism that is capable of rapid reproduction, for example the bacterium E. Coli. The gene for human growth hormone is inserted into the cell. Everything takes place in the conditions of a nutrient solution, as soon as the number of cells increases, the amount of growth hormone produced also increases. After the end of cell multiplication, the next phase occurs, which is purification. Remains of cell walls are removed and ingredients are added, important for a longer life of the resulting product. In the final stage, the drug is prepared in ampoules, which are inserted into application pens. There is no risk of transmission of a fatal disease with recombinant preparations. In addition, synthesizing solves the problem with the amount of the drug, which is now unlimited (but the selling price is still high). Growth hormone in recombinant form has been on the market for more than 30 years.

The following preparations are approved for treatment in the Czech Republic (Škvor, 2012): Genotropin (Pfizer), NgenLa (Pfizer), Humatrope (Eli Lilly), Norditropin (Novo Nordisk), NutropinAq (Ipsen), Omnitrope (Sandoz), Saizen (Merck Serono) and Zomacton (Ferring). These products are available in the Czech Republic with a doctor's prescription and only in some pharmacies. Each medical facility providing growth hormone treatment usually works with several of the companies listed above. Company representatives also supply all accessories such as application pens, growth charts, supplies for transporting growth hormone (thermal bags) and needles that are compatible for the given pen. All applicators are for s.c. use. (subcutaneous), in addition to the pen, Zomacton works as a needle-free transdermal applicator. The choice of the preparation and thus the application pen is up to the attending physician. According to workplace customs, training takes place with an educational nurse or company representative. Thus, the child and his parents always leave the surgery instructed and equipped for the home application of growth hormone. If the patient has an application pen with a needle, he must set the dose prescribed by the attending physician before use.

The application takes place s.c. every day, or just once a week in the case of NgenLa. The preparation NgenLa is specific in its composition, it contains somatrogon[2] instead of somatotropin, which allows application only once a week. For the correct effect, the substance is applied in the evening before going to bed to imitate the natural nocturnal peak of the hormone (Pomahačová & Kalvachová, 2017). It is necessary to store the drug in a refrigerator at a temperature of +2 to +8°C to prevent its deterioration. The ideal injection sites are the front of the thighs or the gluteal muscle. If it is a daily application, the patient must alternate injection sites to avoid the formation of hematomas. The application procedure is similar to, for example, insulin administration. The injection site must be disinfected and allowed to dry, after creating a skin fold, the needle is inserted at an angle of 45°, growth hormone pens cannot be aspired. After inserting the needle and pressing the application button, the patient must wait about 10 seconds for the medicine to be applied in full.

Since the patient applies the growth hormone at home without the supervision of a health professional, it is important that he keeps a record of the application of the drug and its possible omission. Currently, phone applications are available to help the patient monitor the treatment. So far, Merck Serono is the only company that provides the option of treatment through the Easypod smart applicator. This applicator has a great advantage in pre-setting the dose, the child just puts on the needle and can apply himself without daily adjustment of the dose. It also has an intelligent data transmitter. At the next check-up, when the patient comes to the doctor for a check-up, the nurse downloads all the data into the system and has an overview of when the application was missed.

CONCLUSION

It is necessary to control the use of growth hormone not only in the context of comparison with the growth curve of a specific user, but also due to overuse or abuse by a person other than the one indicated (doping athletes, acceleration of the growth of farm animals). Given the

[2] Somatrogon is a protein made from human growth hormone and a small part of human chorionic gonadotropin.

high financial demands of the treatment (financed by public health insurance), it is also necessary to eliminate missing doses due to forgetfulness and their unnecessary expiration, which is facilitated by patient mobile applications.

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EARLY INITIATION OF MOVEMENT THERAPIES FOR CHILDREN WITH POTENTIAL INFLUENCE OF HEREDITARY FACTORS

Eva NECHLEBOVÁ, Monika van ROOIJ

Abstract

This case study highlights the importance of preventive monitoring of a child's musculoskeletal system considering family medical history. Movement therapy should ideally start at an early age to promote healthy development and prevent future injuries or dysfunctions. The case study reveals a family history of hypermobility and improper axial alignment of the lower limbs. As a result, preventive monitoring and a tailored movement regimen were necessary to ensure proper axial development for the youngest family member.

Keywords

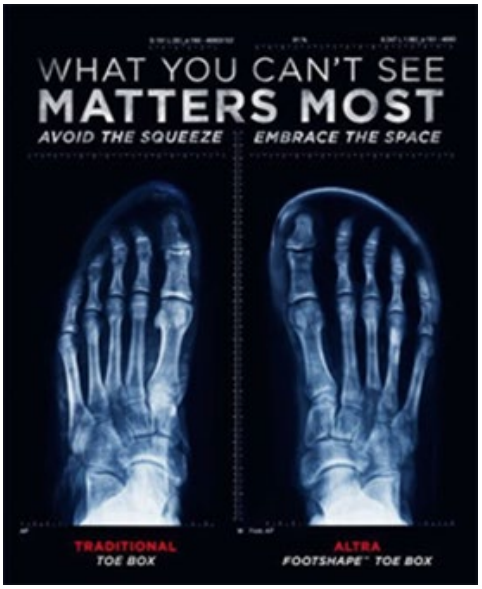
axial alignment of lower limbs, hypermobility, heredity

INTRODUCTION

Freely movable and well-centered joints are essential for the proper sensorimotor development of children (Burgath, 2016). Unfortunately, more than 95 % of children entering the first grade suffer from foot deformities, although only a small percentage are born with them.
Such damage can be caused by various factors, such as:

- Improper shoe size—not only in length but also width.
- Tight socks that restrict free toe movement and may compress small bones and joints.
- Insufficient movement and muscle stimulation (Fyzioklinika, 2023).

Figure 1: Foot position in footwear



Source: ***https://www.conradstoltz.com/index.php/caveman-goes-altra-running/altra-running-shoes-conrad-stoltz-foot-shaped-toe-box-xray/***

To support the healthy development of the entire musculoskeletal system, it is crucial to incorporate as much natural movement as possible, such as walking barefoot, walking on sand, over pebbles, running in shallow water, and performing balance exercises. These activities and proprioceptor stimulation also help prevent flat feet.

When selecting footwear for a child, it is important to ensure adequate width and length to allow free movement of the child's foot.

Attention should also be paid to how the child is handled—for example, during dressing and diaper changes. Rapid unilateral movements or overly forceful limb stretches can disrupt the proper alignment of partner joints and their associated structures, ultimately affecting the quality of foot-to-ground contact (Burgath, 2016).

In adults wearing conventional footwear, acquired foot deformities (e.g., hallux valgus, claw toes, mallet toes, or hammer toes), overall stiffness, and reduced foot function during walking can be observed. These deformities significantly influence overall posture.

Adults can modify their foot alignment by focusing on bio-physical loading forces. Thanks to the spiral and wedge principles, the feet remain stable under load throughout life. The heel bone ideally aligns, and the base joint of the big toe remains in contact with the ground. The middle part of the foot, strengthened spirally between these points, forms a stable arch—aided by the wedge bones and resilient forefoot muscles. This configuration supports anatomically correct foot loading (Lauper, 2018).

If significant postural changes occur, joint dysfunction should be investigated and addressed. Once all joint connections are centered, their positions can be stabilized through independent exercises and further foot stimulation using generally recommended methods.

OBJECTIVE

To support the healthy development of a child's lower limbs considering family medical history and to identify suitable movement activities.

METHODOLOGY

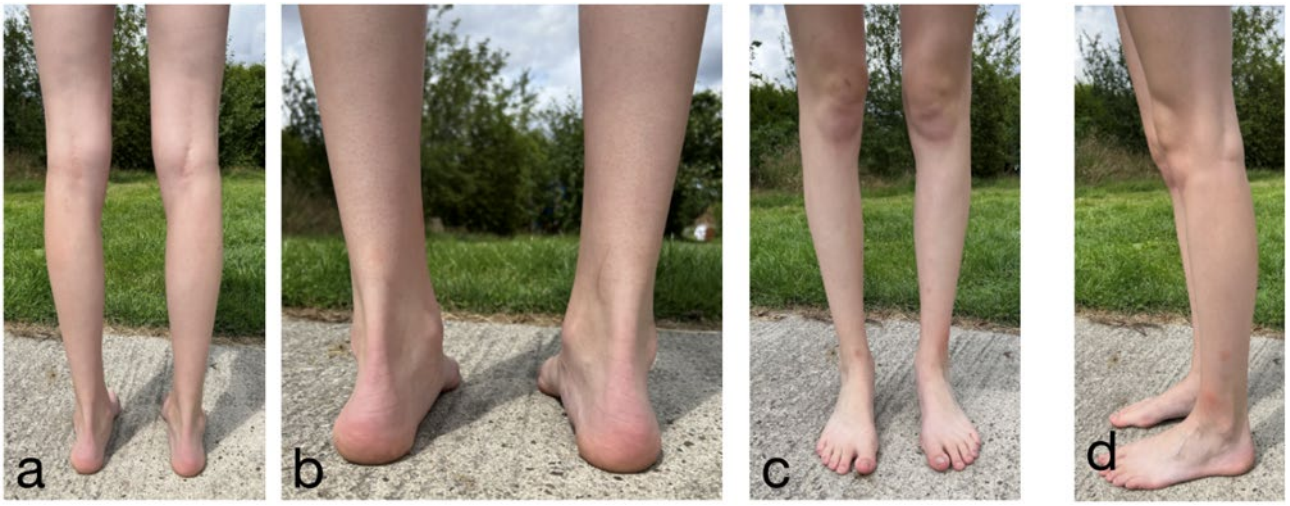
Analysis of lower limb alignment within family members, comparison through photographs, preparation of a therapeutic plan for the youngest family member, and recommendations for others.

Case Study

- Personal History
  Gender: Female
  Age: 4 years
  Fall History: Frequent falls during play, especially when fatigued. Movements occasionally uncoordinated. Most falls occur due to tripping or slipping, impacting hands, knees, coccyx, and head.

Family History:

Figure 2: a, b, c, d: Position of the proband's sister's (18 years old) legs



Source: own

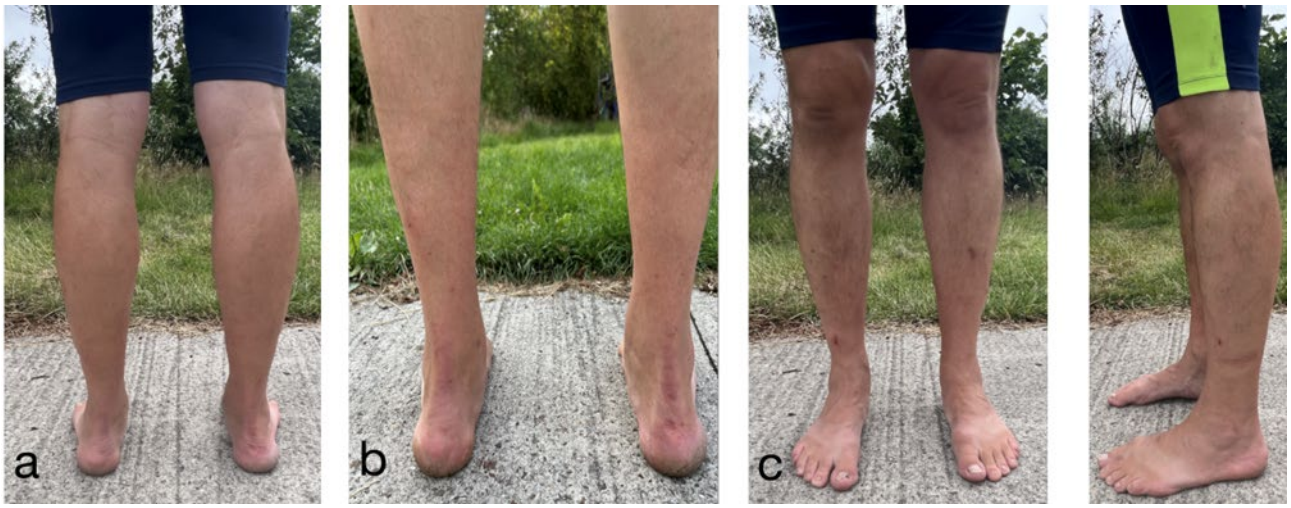
Description: Noticeable inward knee alignment, with the popliteal fossae angling obliquely downward. Slight inward alignment of foot axes forming an "A" shape, insufficient spiraling, and the heel and base joint of the big toe slightly lift the right big toe off the ground. Increased mobility in the right knee joint. Significant balance difficulties during exercises. While cycling, the knees touch, worsening the already disr**u**pted body centration.

Figure 3: a, b, c, d: Position of the proband's brother (15 years old) legs

Source: own

Description: Uneven weight distribution on the lower limbs, with more pressure on the left leg. Pronated foot, outward foot stance, and flattened arches. Hypermobility evident.

Figure 4: a, b, c, d: Position of the proband's father's (47 years old) legs



Source: own

Description: Pronated foot, more pronounced on the right. Reduced weight-bearing on the base joint of the left big toe. Flattened foot arch. The left knee is more outwardly rotated compared to the right, originating from improper positioning of the left hip joint and shortened hip flexors on this side. Hypermobility is apparent. Complaints of left hip and bilateral knee pain, especially under higher loads.

Figure 5: a, b, c, d: Position of the proband's mother's (47 years old) legs

Source: own

Description: Both heel bones tilt outward. The Achilles tendon runs in a curved line. Increased loading on the outer sides of the feet. Previously elevated arches are now more pronounced. Knees point outward. Hypermobility not presen

- Social History

The child lives with parents and an older sister (father's child) in a family house with a garden. The brother lives with his biological mother elsewhere.

- Sports History

Daily outdoor activities. No participation in organized sports.

- Rehabilitation History

No prior therapies.

Figure 6: Leg position at age 2 years

Source: own

Aspection: Age 2 years: Valgus knee alignment, outwardly rotated feet, and flattened longitudenal arches due to improper loading. Pronated feet. The popliteal fossae are angled, and the entire leg rotates inward, disrupting the arch alignment and overall stability. Up to the age of six, such leg alignment is considered normal (Larsen at al.. 2010).

Age 4 years: The outwardly rotated foot position has shifted to the opposite position. Initial photos show uncontrolled foot alignment with visible oblique popliteal fossae lines. Later photos reveal improved heel alignment and Achilles tendon lines, though foot positioning is still suboptimal. The left knee rotates inward more than the right, and the right leg bears more weight. Toes turn inward. Hypermobility and reduced foot arches are evident. Improvements in joint alignment of knees and ankles are visible with corrective attempts.

Figure 7: a, b, c, d: Leg position at the age of 4 years

Source: own

Intervention Description

Leg Length and Pelvic Position Alignment:

- Assessed daily for the first month, then monthly. Immediate correction using Dorn Method techniques for discrepancies.
- Applied pressure on the outer thigh beneath the greater trochanter at a 45-degree angle towards the pelvis, repeated 5-6 times with passive limb movement. Followed by pelvic bone alignment through pressure applied forward and downward on the elevated pelvic bone.

Exercises: Daily playful exercises (1-2 times, 20 minutes). Used balancing aids to strengthen the deep stabilization system.

Figure 8: Exercises to promote proper development

Source: own

Example Daily Exercise:
Balance on a beam—walking forward or sideways at various speeds, aiming not to "fall into the water" below (5-10 minutes).

Figure 9: Exercise on a log

Figure 10: Balancing and concentration training with silicone flasks

Source: own

- Jumping on a trampoline to strengthen the feet (5 minutes).
- Balancing and concentration exercises using silicone cups—standing on four cups to distribute pressure evenly (5 minutes).

After 14 days, the program shifted to:
- Barefoot walks in natural settings (forest, beach, garden) 2-3 times per week for about 20 minutes with breaks.
- Spiral stabilization exercises (Dr. Smíšek's method) three times daily (5-10 minutes for two months).

Stand facing, back to, and side to the rope, with one foot on a platform. See Figure a, b, c. During the preparatory phase, the arms are relaxed in front of the body, palms facing down towards the floor, and the body is relaxed. In this phase, inhale.

Now execute the pull on the rope, transferring the entire weight onto the front foot. Tighten the glutes, abdomen, and pelvic floor while drawing the elbows toward the center of the waist. Maintain a neutral position of the neck and head. The knee of the supporting leg is straight. Palms and forearms rotate upward. Throughout the pull, exhale smoothly. The shoulders are now to the side and down, and the neck remains relaxed. The head is elongated upward in the body's axis, and the stance is firmly on the front foot.

Figure 11: Spiral stabilization exercises

Source: Spiral stabiliation - CD Smíšek

Repeat the exercise 5-10 times on both the right and left foot.

Stand facing the rope, with one foot on a platform. During the preparatory phase, the arms are relaxed in front of the body; see Figure d.

Pull the rope while simultaneously transferring the entire weight onto the front foot and lifting the opposite knee. Tighten the glutes of the supporting leg, pelvic floor, and abdomen. Draw the elbows toward the center of the waist while maintaining axial alignment of the neck and head. The knee of the supporting leg is straight. Palms and forearms rotate upward. The shoulders are now to the side and down, and the neck remains relaxed. The head balances freely along the body's axis, with a firm stance on the front foot.

The knee of the supporting leg remains straight. Palms and forearms rotate upward. The shoulders are now to the side and down, and the neck remains relaxed.

sActivities blended with initial exercises to maintain attention.
Emphasis was also placed on wide shoes allowing free foot movement and daily outdoor activities in natural environments (Smíšek, 2011).

Outcome Measurements

Comparisons of photos taken at ages 2 and 4 showed improvements in foot alignment. Natural foot development was maintained through movement activities, with visible stability improvements in knee joints. Monitoring and tailored exercises will continue.

Figure 12: a, b, c : Output comparison of photographs from 2 years and 4 years

Source: own

DISCUSSION AND CONCLUSION

Proper development of the pediatric musculoskeletal system requires considering family medical history and introducing preventive exercises to instill correct movement patterns. Regular monitoring of leg length and axial alignment is essential, as discrepancies should be promptly addressed. Equal leg length is crucial for balanced and stable joint function, preventing degenerative joint diseases. Regular physical activities strengthen muscles, maintain optimal joint environments, and improve quality of life.

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PSYCHOLOGICAL BENEFITS OF SAUNA CEREMONIES IN THE CONTEXT OF WELLNESS

Lukáš KERHART, Daniela STACKEOVÁ

Abstract

The health benefits of sauna bathing are described in detail, including the psycho-hygienic effects. The article addresses the psychological benefits of sauna ceremonies in the context of wellness and well-being. The main aim of the study was to analyse the respondents' feelings and experiences of sauna bathing, including sauna ceremonies, and to find out whether it helps them in maintaining their psychological well-being and what they experience during sauna ceremonies. A semi-structured interview method was used. The research sample consisted of 27 respondents who regularly took sauna including sauna ceremony. When asked what respondents found to be the benefits of sauna ceremonies, the most common answers were that it was an ideal form of relaxation, psychological hygiene and a tool for stress relief. During sauna ceremonies they experience feelings of complete relaxation and relief, pleasant and joyful feelings.

Keywords

sauna, sauna ceremony, psychohygiene, wellness, well-being

INTRODUCTION

One of the world's best-known wellness treatments with many health benefits is sauna bathing. It is an activity that has been practised for centuries, especially in Scandinavian countries, and is particularly popular here. In many countries, sauna bathing is a complex ritual consisting of many different phases, and many different principles and rules must be observed.

The term *sauna* comes from the Finnish language and can be translated into Czech as „a house in the form of a bath where the air is heated by a furnace". Experts believe that the term was derived from another Finnish term *sakna*, which is used for a hole in the ground or snow. The form of the sauna as it is known today, a wooden log cabin, dates back at least 2500 years (Mikolášek, 1972).

The first mention of „sauna" facilities dates to ancient times. These included the sweat tents built by the prehistoric Scythians on the Black Sea, the stone baths of the ancient Greek population in Laconia, the tepidarium baths of Pompeii, the baths built by Germanic tribes, and the smoke baths of ancient Slavic tribes (Kriš, 1999).

Over the years, buildings were also built directly for sauna use in the form of simple huts or log cabins. In modern times, these were buildings made of first-class wood, which were perfectly insulated thanks to the mineral fibres used, in which the hot stones are poured with water or electronic stoves are built in.

The first sauna was built on Czech territory in 1936, at a summer camp near the town of Borovec. The author of the first Czech sauna was František Vojta. In the post-war period, namely in 1946, the first sauna open to the public was built in Brno-Pisárky (Mikolášek, 1972).

In addition to the many different types of saunas, there are also different types of saunas in terms of the sauna process. Based on the number of times the sauna process is repeated within a single session and the final effect of the sauna on the human body, the following types can be distinguished:

- Sauna irritant
- Sauna invigorating
- Relaxing sauna (the most widespread and popular, in which the first three stages of the sauna process are repeated three times)
- Fatigue sauna
- Exhausting sauna.

In no case may the sauna warming phase be repeated more than five times. If this happens, sauna bathing can have a rather negative effect on the body. Specifically, it can induce an imbalance in the body's ion management and shock the body (Mikolášek, 1999).

Sauna bathing brings several health benefits when practiced regularly, especially in the areas of the skin system, cardiovascular system, respiratory system, immune system and also the psyche. Sauna bathing is considered a relaxation and therapeutic method. During the sauna, positive feelings are induced in the human psyche, the tensed mind is relaxed, and the general mood is lightened. In the same way, this activity has a positive effect on people suffering from anxiety or accumulated aggression and tendencies to violence. Sauna has a very stimulating to euphoric effect on the overall psychological state (Mikolášek, 1999).

Sauna ceremonies

Sauna ceremonies have become a part of the wellness practice. These are a cultural enhancement to the normal sauna session performed by an experienced sauna master. During the ritual, he pours aromatic essence on the stones, swirls hot air with towels and wraps the guests (steam blast). The ceremony is also accompanied by relaxing or, on the contrary, rhythmic and dynamic music. The whole ceremony usually lasts 10-15 minutes.
The whole sauna ceremony consists of several basic stages. Each sauna can implement its ceremony in its own way, but the basics always remain the same. Specifically:

1) A trained expert (sauna master) will first start pouring aromatic essence over the heated stones, thereby increasing the humidity and air temperature within the sauna.
2) Then comes the show itself, during which the sauna master agitates through a towel the hot air in the sauna room, which is held at the highest point in the room - under the ceiling of the sauna.
3) In the last step, the so-called steam blast takes place. This involves wrapping the towel around the body, which further multiplies the effect of the hot air on the body and helps to open the pores on the skin.

The above procedure is usually repeated several times, most often three times. During the last procedure, the temperature in the sauna can reach up to 93 °C. This is a physically demanding exercise for the sauna master, who is often rewarded with applause from the audience at the end.

Although there are many sauna ceremonies and they can differ significantly, there are generally two main types of sauna ceremonies. Specifically:

- Relaxation ceremony – this is a type of sauna ceremony, which is intended for all visitors who are looking for rest, peace and relaxation. In this type of ceremony, slow, calm and relaxing music is played, the darkness adds to the intimate atmosphere

and the sauna master uses mainly relaxing and soothing scents. In this type of ritual, the main goal is to make the participant as relaxed as possible.

- Dynamic ceremony – in this case, it is a type of ceremony that is mainly aimed for amusement and relaxation. It is meant to be a cultural experience that takes place in a slightly busier and more dynamic style. Accompanied by fast paced and dynamic music, a light show and stimulating essences, the participant can enjoy the experience and relaxation all in one moment.

OBJECTIVES OF THE STUDY AND RESEARCH QUESTIONS

The main aim of the study was to analyse the respondents' feelings and experiences during sauna ceremonies and to find out whether they help them to maintain their psychological well-being.

Research question: How do the respondents subjectively perceive the effect of sauna including sauna ceremonies on their psychological well-being?

METHODS

A semi-structured interview method was used.

Respondents were first asked about their age, education and occupation.

Then they answered the questions:

- What does the sauna ceremony give you personally and what is the importance of ceremonies for you in terms of psycho-hygiene?
- What are your feelings during sauna ceremonies?
- Do you prefer relaxation or dynamic ceremonies?

Responses were recorded in written form and transcribed into a selective protocol and then a thematic analysis was conducted.

CHARACTERISTICS OF THE RESEARCH SAMPLE

The research was conducted anonymously and 27 respondents participated. The participants were individuals who regularly attend sauna sessions and were over 18 years of age. They visit saunas in the capital city of Prague, specifically in Step Praha, Sauny VItava and Sauna Spot. Here the respondents were also approached.

Of the 27 respondents, 16 were women and 11 were men.

The most frequent age group (14 out of 27 respondents) was 19-30 years old; 4 respondents were 30-40 years old; 6 respondents were 40-50 years old, and 3 respondents were 50-60 years old.

In terms of educational attainment, 17 out of 27 respondents were persons who had attained a university degree. The current occupation of the respondents was variable (students, doctors, lawyers or people working in IT fields, and others).

RESULTS

When asked what specifically sauna ceremonies bring to the respondent, what this activity gives him/her, the most frequent answers were that it is an ideal form of relaxation, psychohygiene and a tool for stress relief.

R1 commented on this topic that sauna use *brings him mainly peace, rest and overall relaxation. During this activity, the respondent's mind completely switches off*. R2 stated that sauna

bathing *brings him relaxation* and R3 stated that sauna ceremony *brings relaxation* and considered it as *a form of mental cleansing*. The same answer was given by another respondent (R4) who stated that for him the sauna ceremony is *a relaxation after a busy week and an effective tool for stress relief*. R5 perceives the sauna ceremony as *a form of rest and relaxation, in which he gets rid of accumulated stress*. R6 perceives sauna ceremonies *primarily as a form of rest and relaxation, or as a time to enjoy every moment*. *As well as a tool that can relieve him of accumulated stress.* The same answer was given by R7, who stated that *sauna ceremonies are mainly a form of mental cleansing and relaxation for him. Similarly, for him, sauna sessions are a tool that he uses to relieve himself of stress from work.* R8 also stated that he perceives sauna ceremonies *mainly as an experience and a diversification of the traditional sauna, similarly as a form of mental cleansing and relaxation.* R9 sees sauna ceremonies primarily as *a form of mental cleansing, relaxation and rest*. R10 perceives sauna ceremonies as *a habit, an addiction and a form of relaxation* and R11 perceives sauna ceremonies as *an experience to look forward to throughout the week and feels happy during the ceremony*. R12, on the other hand, stated that he perceives sauna ceremonies as *a non-traditional experience, a form of relaxation, regeneration and mental cleansing*. R13 perceives sauna ceremonies as *a non-traditional experience, a form of relaxation and stress relief*. Even R14 perceives sauna ceremonies primarily as *a non-traditional experience, a form of rest, relaxation and stress relief*. R15 stated that sauna ceremonies are *a non-traditional experience for him, a form of rest, relaxation and stress relief*. R16 perceives sauna ceremonies as *a non-traditional experience, a form of rest, relaxation and stress relief* and R17 and R18 answered the same. R19 also answered that he perceives sauna ceremonies as *a form of rest and part of his psychohygiene* and R20 answered the same. R21 perceives sauna ceremonies as *a cultural experience but also as an effective form of rest, relaxation and part of his psychohygiene*. Similarly, R22 sees sauna ceremonies as *a cultural experience but also as an effective form of rest, relaxation and part of his psychohygiene*. R23, R24, R25 and R26 are also of the same opinion, and consistently stated that they see this activity as *a cultural experience, but also as an effective form of rest, relaxation and part of their psychohygiene.*

Respondents were also consistent in their answers to the question of what specific feelings they experience during a sauna ceremony. Most often they experience feelings of complete relaxation and relief during sauna ceremonies (14 out of 27 total). Eight respondents reported experiencing pleasant, joyful and wonderful feelings during ceremonies. Seven respondents then reported that sauna and sauna ceremonies bring them new energy.

R1 *can feel his own body, which brings him pleasant and carefree sensations.* R2 responded to this question that *he feels mostly energetic and refreshed.* R3 feels *mainly energetic, relaxed and optimistic and lives in the current moment.* R4 feels *pleasant feelings and euphoria when taking a sauna.* R5 feels *content, relaxed and pleasant*. R6 also experiences the same feelings when sauna bathing and stated that he feels *content, relaxed and pleasant*. R7 experiences *a complete switching off the mind during the sauna, or the emergence of new ideas*. R8 feels *wonderful and fulfilled*. R9 stated that he feels *absorbed by the atmosphere, relaxed, satisfied and energised*. *He*

experiences feelings of euphoria and happiness during the ceremony. R10 feels *invigorated, satisfied and energized*. R11 briefly expressed that *he feels happy*. R12, R13 and R14 experience *mainly carefree feelings*. R15, R16, R17, R18 and R19 said that they feel *comfortable, relaxed and full of energy*. R20 feels *rested and relaxed*. R21 feels *blissful, content, and feels a rush of euphoria during the ceremony*. R22 feels *content*. R23 feels *content and relaxed*. R24 and R25 feel *mostly content*. R26 feels *rested, relaxed, refreshed and energized* during the ceremony. R27 stated that he feels *at ease*.

When asked which type of sauna ceremony respondents prefer, dynamic or relaxation, respondents were most likely to not care. Respondents most often stated that they like to alternate the types of sauna ceremonies or do not care which type of ceremonies are available. This option was chosen by 17 of the 27 respondents. 6 respondents stated that they prefer the relaxation type of ceremonies, while the remaining 4 prefer the dynamic type of sauna ceremony.

LIMITS OF THE RESEARCH STUDY

We consider the research study to be a pilot study in terms of the number of respondents and the scope of the survey. Its results serve as a basis for further investigation of the influence of sauna on well-being, for a deeper analysis of human experiences associated with the specific physical state induced by sauna and also for the specification of psychological benefits of sauna ceremonies.

DISCUSSION AND CONCLUSION

The results of our study demonstrating that sauna use, including sauna ceremonies, brings respondents relaxation, stress relief, and joyful feelings are seen as significant in the context of the potential use of sauna bathing in interventions aimed at promoting well-being.

The influence of sauna bathing on the psyche is mostly studied from the perspective of psychohygiene and prevention of pathological phenomena, but not as a means of promoting well-being, which is where we see the contribution of our work. However, anxiolytic and antidepressant effects are significantly related to the promotion of well-being.

There are several studies showing that sauna bathing can be beneficial for people suffering from depression or increased fatigue. In a randomized controlled trial, patients with mild depression underwent sauna sessions at a frequency of five days a week for two weeks. Compared to the control group, scores for somatic complaints and overall relaxation improved significantly (Masuda, Nakazato & Kihara, 2005).

Patrick and Johnson (2021) describe the effect of heat stress on promoting neurogenesis, reducing anxiety and depression, and reducing the risk of neurodegenerative diseases.

Dudzik, Dudzik, Kozieł & Domański (2024) also reported the effects of sauna use on reducing anxiety and depression and reducing the risk of neurodegenerative diseases, as well as promoting well-being, improving sleep and reducing stress.

Hussain & Cohen (2018) in their review study also mention the effect of sauna bathing on reducing depression as well as its positive effect in the treatment of headaches.

Laukkanen, Laukkanen & Kunutsor (2018) describe the effect of sauna use on reducing the risk of psychotic disorders Their study showed a relationship between sauna use frequency and the risk of psychotic illness in men with no prior history of mental illness.

In the Japanese context, the effect of sauna on mental health is usually associated with the *totonou state*, which is described as a state of harmony of body and mind, associated with a feelings of relaxation and happiness.

Chang, Ibaraki, Naruse & Imamura (2023) in their study looked at changes in the nervous system induced by sauna exposure. Participants in the study had changes in brain activity measured by EEG and changes in mood measured by scaling after sauna bathing in a totonou state. Significant increases in theta and alpha waves after sauna bathing were found to correlate with subjectively perceived improvements in emotional state.

The results of our study are consistent with the description of the sauna-induced totonou state. This state has elements close to the meditation state and thus one could also consider possible spiritual aspects of sauna bathing.

In the Czech Republic, the sauna is perceived and scientifically studied most often as a means of regeneration and relaxation. We see the analysis of psychological benefits of sauna as a topical issue especially for the fields dealing with wellness and well-being and we consider further research in this area desirable.

We also see the prospects for further research in a more detailed investigation of the mechanisms of the effects of sauna use on the psyche. Probably both direct and indirect (i.e. changes in the psyche mediated by changes in the physical state) effects are involved.

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