

# Zdravotnictví a sociální práce

Mezinárodní vědecký časopis

Vysoké školy zdravotnictví a sociální práce sv. Alžbety, n.o., v Bratislavě  
a Fakulty zdravotnictví a sociální práce Trnavské univerzity v Trnavě

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and Faculty of Health and Social Work Trnava University in Trnava

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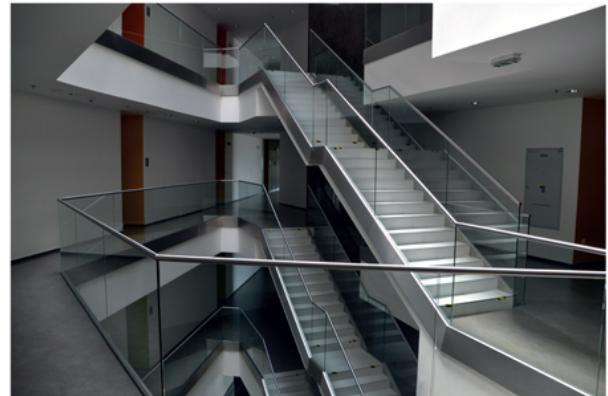
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# ZDRAVOTNÍCTVO A SOCIÁLNA PRÁCA / ZDRAVOTNICTVÍ A SOCIÁLNÍ PRÁCE

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## EDITORIÁL

Milí čitatelia,

časopis Zdravotníctvo a sociálna práca začal vychádzať v roku 2006 na Fakulte zdravotníctva a sociálnej práce blahoslaveného P. P. Gojdiča v Prešove Vysokej školy zdravotníctva a sociálnej práce sv. Alžbety, n.o., v Bratislave. Z odborného časopisu sa na základe kvality príspevkov čitateľov postupne vypracoval na vedecký časopis. Od roku 2009 sa stal nielen vedeckým časopisom ale aj medzinárodným časopisom. Vychádza v Slovenskej aj Českej republike, je distribuovaný v slovenskej aj v českej verzii. Od roku 2011 vychádza časopis na Slovensku aj v Čechách, nielen v printovej ale aj v internetovej forme. V snahe umožniť prístup k časopisu aj študentom je elektronická forma časopisu dostupná bezplatne na internetovej adrese [www.zdravotnictvoasocialnapraca.sk](http://www.zdravotnictvoasocialnapraca.sk) a [www.zdravotnictviasocialniprace.cz](http://www.zdravotnictviasocialniprace.cz) a časopis je nepredajný. Na druhej strane sa muselo pristúpiť k zavedeniu poplatkov za uverejnenie článkov. Od čísla 3/2014 sa rozšírilo tématické zameranie časopisu tak, že pokrýva jednak zdravotnícke odbory, ako sú Ošetrovateľstvo, Verejné zdravotníctvo, Laboratórne vyšetrovacie metódy (LVM) v zdravotníctve, jednak ďalšie pomáhajúce profesie ako sú Sociálna práca a Pedagogika. Pristúpilo sa ku spolupráci s Fakultou zdravotníctva a sociálnej práce Trnavskej univerzity v Trnave. V súčasnosti časopis vydávajú spoločne Fakulta zdravotníctva a sociálnej práce Trnavskej univerzity v Trnave a Vysoká škola zdravotníctva a sociálnej práce sv. Alžbety, n.o., v Bratislave. Časopis vydáva Supplementum, do ktorého sa zaraďujú štruktúrované abstrakty z medzinárodnej konferencie organizovanej Vysokou školou zdravotníctva a sociálnej práce sv. Alžbety. V roku 2017 vychádzal v poradí 12. ročník časopisu.

V súčasnosti, v záujme zvyšovania kvality časopisu, musia mať príspevky zaslané redakcii štruktúrovaný abstrakt. To znamená, že s výnimkou prehľadových článkov (review) už redakcia nebude akceptovať pôvodné (originálne) práce, ktoré autori pošlú s neštruktúrovanými abstraktmi a tieto budú autorom vracané na prepracovanie. Pokračujeme v zaraďovaní príspevkov v anglickom jazyku. Tomu predchádzala zmena požiadavok pre spracovanie rukopisov príspevkov a prechod na harvardský systém citovania literatúry zavedené v roku 2016 s cieľom priblížiť sa štandardu obvyklému v medzinárodných časopisoch vydávaných v angličtine z oblasti zdravotníctva a pomáhajúcich profesií. Našou dlhodobou snahou je, aby sa z časopisu stal postupne časopis stredoeurópskeho významu a bol zaradený do medzinárodných databáz. V tomto roku sa nám podarilo dosiahnuť zaradenie časopisu do databázy Central and Eastern European Online Library – CEEOL. V súčasnosti je časopis je indexovaný v slovenskej národnej databáze Bibliographia Medica Slovaca (BMS) a v medzinárodnej databáze CEOL a je zaradený do slovenskej citačnej databázy CiBaMed.

Prof. MUDr. Miron Šramka, DrSc.  
Šéfredaktor

\* \* \* \* \*

## PODIATRY, PODOLOGY AND PEDICURE

## PODIATRIA, PODOLÓGIA A PEDIKÚRA

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### **Abstrakt:**

**Úvod:** The terms Podiatry, Podology and Pedicure are specific to each Country in the World. Not every State has Podology or Podiatry and the Determination of Competences for these occupations are unique to a given State.

**Jadro práce:** For the exact specification of the terms which are using in Slovakia, we used the traditions of our neighboring countries. The term pedicure means treating a non-critical client with aesthetical treatment of feet. A non-critical client is a client without total health problems and with healthy legs. Podology is the medical prophylactic treatment of the feet of semi-critical clients by health-educated podologists. Semicritical client is a client with a disease that influences the condition of the legs and the injuries of the patient will not be treated standardly.

**Záver:** Podiatry is the term for a medical intervention treatment in critical patients with leg defects. Critical patient is a patient who has a overall disease condition affecting the feet and has wounds that need medical intervention in order to completely healed.

**Keywords:** Podiatry, podology, pedicure, non-critical patient, semi-critical patient, critical patient, Classification System for Occupation

### **Abstrakt:**

**Úvod:** Pomenovanie podiatrie, podológia a pedikúry je špecifické pre každý štát na svete. Nie každý štát má podológiu alebo podiatriu a určenie kompetencií pre tieto zamestnania sú jedinečné pre daný štát.

**Jadro práce:** Pri presnej špecifikácii pojmov pre používanie na Slovensku sme vychádzali z tradícii nám blízkych krajín. Pod pojmom pedikúra rozumieme ošetrenie nekritického klienta postupmi estetického ošetrenia nôh. Nekritický klient je klient bez celkových zdravotných ochorení a so zdravými nohami. Podológia je zdravotné profylaktické ošetrenie nôh semikritických klientov zdravotne vzdeleným podológom. Semikritický klient je klient s ochorením, ktoré vplýva na kondíciu nôh a prípradné zranenia sa nebudú liečiť štandardne.

**Záver:** Podiatria je pojem pre lekárske intervenčné liečenie nôh kritických pacientov s defektami. Kritický pacient je pacient, ktorý má celkové ochorenie vplývajúce na kondíciu nôh a na nohách má rany, ktoré si vyžadujú lekársku intervenciu pre úplné zhojenie.

**Kľúčové slová:** pedikúra, podológia, podiatria, nekritický pacient, semikritický pacient, kritický pacient, klasifikačný systém pre povolanie.

## INTRODUCTION

Podiatry, podology and pedicure are fields engaged in foot care. However, each of these is quite different. On the basis of the analysis, we can confirm that each country has its own name and description for the above-mentioned fields. In some countries there is no podology, some do not know what podiatry is, some neither recognize podiatry nor podology and only deal with pedicure. In some countries there is a branch of medicine devoted to foot care and diseases of legs without any special term. By virtue of its essence and common features, we can in principle divide the foot care into aesthetic and medical treatment with regard to its purpose.

## WHY DID SLOVAKIA MAKE THESE TERMS SEPARATE ?

In 1993, a new era of foot care began in the Slovak Republic. Prior to 1993, pedicure was classified as a communal service. Its purpose was to treat feet using the wet method (scalpel). However, only healthy feet could be treated. Prior to 1993, the "Bat'a pedicure school" in Zlín already offered courses on dry treatment methods and instrument foot care. Due to the fact that technology necessary for such treatment was either obsolete or hard to get, these techniques simply ceased to be taught and practiced. Pedicure focused only on wet method. With the onset of 1993 came new learning opportunities - many pedicurists traveled abroad to gain new knowledge and technologies. The most popular destination was and still is Germany. Germany has a very long tradition of foot care and the pedicure industry is booming there.

After 1993, an initiative was launched in Slovakia to introduce a "new" dry pedicure technology. Initially, many pedicurists did not care for this technology. The first application for the authorization of dry - instrument pedicure was submitted to the Regional Public Health Office in Banská Bystrica, where the first instrument pedicure center in Slovakia was established. Ten years later, the first nail materials and nail prosthetics appeared on the Slovak pedicure market. Still, there were no trainers who would teach pedicurist how to work with these materials. At that time, more and more clients were asking for treatments of more complex problems. Treating hyperkeratosis and nail shortening with the subsequent aesthetic treatment was at that time getting more complicated as clients demanded treatment for varied foot problems and complex disorders associated with problematic wounds, for example clients with diabetes mellitus and other diseases that affect the quality of foot skin, clients with problematic nails (nail growth problems, cracked and distorted nails and nails affected by various pathogens). Pedicurists were required to broaden their spectrum of medical knowledge. Lecturers who studied abroad and brought new knowledge and skills to Slovakia has gradually started to appear. The broad pedicure community has begun to attend various advanced courses. Access to foreign literature was becoming easier. In 2014, with the use of IT technology, pedicurists established their own Facebook page (facebook - Profesionálna pedikúra – podológia). The group is aimed at those who are interested in dealing with foot problems rather than their aesthetic appearance. The hygienic criteria placed on pedicurist start to be more demanding. Collaboration with doctors from different disciplines is becoming

more and more popular. There are numerous trainings, workshops, seminars and congresses at the market focusing on the topics of cooperation of pedicurists with doctors, surgeons, diabetologists, dermatologists, angiologists and doctors treating chronic wounds. Pedicure moves closer to healthcare. The need for separation of aesthetic pedicure and medical pedicure is even more evident. The word "podologist" taken from the German vocabulary resonates very well within the community of foot specialists. Due to the increasing number of patients with diabetes mellitus, the number of clients with semi-critical to critical conditions of feet increases, diabetological and surgical outpatient departments need help with treating the overwhelming numbers of patients. Both sides see tremendous successes. However, problems associated with improper treatments of feet of such patients start to emerge as well.

This alarming state led to negotiations on the possibilities of introducing a new field of health education - podology. The German and Swiss models were taken into account when discussing the issue. During negotiations with representatives from the Ministry of Health of the Slovak Republic it was agreed that pedicure, podology and podiatry are to be classified as three different groups of experts dealing with foot care. During the negotiations, the Swiss model served as an example. The model divides the treatment of patients based on the risk taken. Patients are divided into three groups: non-critical - pedicure (pedicure course), semi-critical - podology (medical study of podology) and critical - podiatry (medical intervention).

The need to define pedicure, podology and podiatry arose because in the Classification System for Occupation, the competences of a pedicurist also covered, among others, treatment of the diabetic foot and patients with vascular diseases. The Classification System for Occupation describes a pedicurist as follows:

The pedicurist performs professional foot and nail care using wet or dry pedicure method. The pedicurist treats nails and skin around nail, hyperkeratosis of the skin and ingrown nails. Wet pedicure softens the skin, shortens nails, shapes them. Dry pedicure brushes feet using various foot files (with/ without suction or cutters of various sizes), shortens nails, shapes them. The pedicurist has knowledge of cosmetic preparations that are used in pedicure. They know their composition, properties, effects and use, storage. **The pedicurist treats diabetic foot**, feet that suffered mechanical damage or post-traumatic states, sweaty feet. The pedicurist treats corn, reduces natural nails, treats ingrown nails using sponges, tampons or undercuts, provides expert advice on home care, on the proper use of shoes and the use of orthopedic aids in case of orthopedic deformities. The pedicurist adheres to hygienic principles and requirements and also uses products and means that do not compromise the health of customers and sterilizes his tools.

The performance of this job is governed by the following legal regulations:

- 273/2010 DECREE of the Ministry of Health of the Slovak Republic of 28 May 2010, amending Decree of the Ministry of Health of the Slovak Republic no. 585/2008 Coll., laying down details on the prevention and control of communicable diseases.
- Act no. 355/2007 Coll. on the Protection, Promotion and Development of Public Health and on Amendments to Certain Acts as amended ([www.sustavapovolani.sk](http://www.sustavapovolani.sk)).

Due to the lack of emphasis on correct naming when creating the definition of pedicurist, we can conclude that the makers did not understand the complexity of the problem of treating the diabetic foot. The complexity of this disease and the specification of the concepts are extremely important here and practice shows us that treatment of the diabetic foot cannot be left to pedicurist specializing in aesthetic treatments.

Diabetes mellitus is a complex disease. These patients fall into the group of semi-critical clients - patients suffering from diabetes mellitus without external manifestations of the disease (healthy legs and feet). Patients with the diabetic foot fall into the group of critical patients. These patients should be treated only by specialists - a physician, a surgeon or an angiologist specializing in chronic wounds. Therefore, we consider that the treatment of the diabetic foot shall be left out of the scope of competencies of a pedicurist.

For completeness, it should be added that the diabetic foot is defined by the International Consensus as ulceration or degeneration of deep leg tissues including the ankle. In addition to ulceration, diabetic foot is usually accompanied by gangrene, but can also be accompanied by osteomyelitis or Charcot arthropathy, or deep soft tissue infections (e.g. phlegmon). The term diabetic foot also includes diabetic neuropathy and varying degrees of ischemia, states after amputations in the lower limbs (Jirkovská 2006).

During the negotiations on the new field of knowledge, podology, we relied on the definition and description of this field by Prof. Dr. med. Wolfgang Grabner.

Podology is a non-medical field that provides comprehensive foot care. In order for this comprehensive care to be successful, it is necessary to cooperate with doctors from various fields. Podology is often confused with simple foot care or cosmetic care.

Experts are of the opinion that podology is a complex field that connects many medical disciplines. The most important are diabetology, internal medicine, endocrinology, angiology, orthopedics and dermatology (Grabner, Erlangen-Nuremberg University)

Following the negotiations with the representatives of the Ministry of Health of the Slovak Republic, the following definition of podology is now applicable in the Slovak Republic: Podology is a health treatment of feet of semi-critical (medium-risk) clients and critical (risky) clients to the extent recommended by the respective medical practitioner. Podological treatment includes: examination of the whole locomotor system with focus being placed on the foot and lower limbs, treatment of feet affected by various dermatological diseases, treatment of nails including the reconstruction of the permanently damaged nail plate and treatment of permanently damaged nails, supporting treatment of mycotic nails, treatment of diabetic foot (to the extent of a physician's recommendation), treatment of hypergranulations in the case of ingrown nails (to the extent of a physician's recommendation), treatment of corn and calluses of clients with vascular insufficiency, treatment of hyperkeratoses of various aetiologies. The podologist has the basics knowledge of pharmacology, wound dressing, know how insoles are made and is able to make an individual corrector to correct the shape and deformation of the toes of the feet.

## RISK GROUPS CLIENTS WHO SHOULD SEEK TREATMENT IN PODOLOGIC CENTERS:

- Metabolic disorders (e.g. diabetes mellitus with polyneuropathy, scleroderma, etc.)
- Rheumatoid arthritis (e.g. chronic polyarticular disease)
- Inflammatory disorders (vascular and venous)
- Geriatric patients
- Patients with neurological problems (e.g. polyneuropathy, paralysis, multiple sclerosis, poliomyelitis - polio, etc.)
- Medication treatment (e.g. immunosuppressive, anti-clotting drugs, cortisone drugs)
- Haemophilia and tendency to haemorrhage (bleeding diathesis)
- Infectious diseases (e.g. MRSA - *Staphylococcus aureus* resistant to methicillin).

Patients with limited, impaired or lacking perception of pain, pressure, injury, cold, heat are at risk by not being aware of injuries, inflammation and infections on their feet. Limited body defenses against infections caused by disease and/or therapy, together with limited congestion, risk that injuries will heal badly or will not heal at all and lead to amputation.

The term "risk client" means client whose wounds heal very slowly or has recurring infections. The pathological causes of slow wound healing are:

### Vascular and vein limitations:

- Peripheral vascular disease from stage 2 upwards
- Chronic venous insufficiency
- Different diseases of the circulatory system with increased risk of bad wound healing and infections (eg Bürger's disease, Raynaud's disease, etc.)
- Long-term or permanent anticoagulation therapy

### Neurological factors:

- Polyneuropathy (e.g. diabetes mellitus, alcoholism, polyarthritis, etc.)
- Tetraplegia
- Paraplegia
- Hemiplegia
- Multiple sclerosis
- Condition after poliomyelitis

### Diseases with subsequent weakening of the organism (increased risk of infection):

- Nephropathy (e.g. dialysis patients)
- Oncology patients
- Separate viral diseases (e.g. AIDS, hepatitis)

### Diseases requiring immunosuppressive drugs:

- Post-transplantation conditions
- Radiation or chemotherapy

- Rheumatoid arthritis diseases
- Allergies

*Patients taking long-term medication that slow down wound healing:*

- Cortisone
- Drugs for rheumatoid diseases
- Patients on anticoagulant therapy
- Others

*Pathologies:*

- Haemophilia and tendency to haemorrhage (bleeding diathesis)
- Others (BBT Regulations, 2012)

## CONCLUSION

Podiatry is defined as a medical field devoted to the study, diagnosis, and medical and surgical treatment of disorders of the foot and ankle (specialists include diabetologists, surgeons, dermatologists, angiologists and rehabilitation physicians), and treatment of critical patients with leg disorders.

In order to create precise definitions and job descriptions (pedicurist, podologist and podiatrician) we relied on descriptions from other countries.

Over the last two decades of the last century, we have witnessed a great boom in pedicure and foot care. Countries abroad paid a lot of attention to the issue of separation of the pedicure as aesthetic treatment of feet from the medical treatment of feet. Around that time the concepts of podology and podiatry started to be more prominent and each of them was defined very precisely.

Podiatry in Latin America, North America, and other English-speaking countries is seen as a matter of foot care as a medical treatment of conditions of feet. People performing such care are foot and ankle surgeons who perform foot surgeries, treat diabetic foot and intervene into the integrity of the skin and deeper tissues.

In Europe, podology is evolving as a separate medical branch, especially in Germany, Switzerland and Italy. In these countries, foot care falls under medical studies.

In the United Kingdom, "chiropody" is being formed. It's just another name for podiatry. It is the medical treatment of feet focusing primarily on diabetic foot. Podiatry is thus seen as a medical branch focusing on orthopedic foot deformities and diabetic foot syndrome. In Britain, there exists a special occupation - Foot Health Practitioner, who performs a wide range of foot treatment without interfering with the integrity of feet or drug prescription. At certain stages this foot health practitioner may carry out preventive treatment of diabetic foot or non-surgical intervention in patients affected by arthritis, various hyperkeratotic conditions and the like. Pedicure in Britain is seen as an aesthetic treatment and the pedicurist cannot use a scalpel or various tools to shorten nails.

Worldwide, pedicure still remains to be seen as an aesthetic treatment of feet. The Slovak Republic is today on a brink of a great change that will move Slovakia closer to the global trends.

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## “GREY ZONE“ OF BREAST LESIONS WITH FOCUS ON INFILTRATING EPITHELIOSIS OF BREAST

### „ŠEDÁ ZÓNA“ PRSNÍKOVÝCH LÉZIÍ SO ZAMERANÍM NA INFILTRUJÚCU EPITELIÓZU PRSNÍKA

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#### Abstract

**Introduction:** Breast cancer forms a heterogeneous group of lesions with variable clinical and morphological presentation. Breast cancer includes lesions showing borderline morphological and clinical features. Such lesions occur in the grey zone between benign and malignant lesions and their behaviour cannot be predicted clearly. Morphological classification of these lesions is very demanding, often biased and leading to various diagnoses that trigger over- or under-treatment of patients. In order to understand these lesions, we use the progressively developing molecular biology, the results of which may or may not be manifested in the estimation of the clinical behaviour of these lesions.

**Current State of Things:** Malignant breast cancer is manifested by a wide range of differentiation or phenotypic diversity that is based on engagement of various pathological molecular signalling pathways. There are lesions that are characterized with ambiguous histological picture and show malignant histomorphological changes, but have a significantly limited metastatic potential.

**Infiltrating Epitheliosis:** Infiltrating epitheliosis (IE) is a rare complex sclerosing lesion (CSL) of the breast characterized by infiltrating ducts immersed in a scleroelastotic stroma. The ducts are filled with cells having cytomorphological and architectural patterns reminiscent of those of usual ductal hyperplasia. (UDH). In most cases, IE is located within or close to the usual ductal hyperplasia (UDH), papilloma, micropapillary duct carcinoma situ, and low grade adenosquamous carcinoma. Nowadays, even experienced breast pathologists include IE into the group of radial scar (RS) lesions/complex sclerosing lesions (CSL) of the breast basically on a global level. To date, there has actually been no clear published case in which a benign or malignant

nature of a lesion would have been determined and therefore the infiltrating epitheliosis is currently defined as a breast lesion with uncertain malignant potential. As a part of correct diagnostics, it is very important to perform the histopathological and immunohistochemical analysis of the infiltrating epitheliosis, the diversity of which is proven by recent genetic analyses.

**Conclusion:** Infiltrating epitheliosis is a rare breast cancer lesion. In terms of the results comparing immunohistochemical examinations and genetic analyses it can be stated that IE is a clonal, neoplastic lesion. It is basically a proliferative “ending” of the RS/CSL lesion range. Performed genetic analyses suggest that infiltrating epitheliosis may be a substrate that may develop into a ductal carcinoma in situ and a low-grade adenosquamous breast cancer. In order to prevent patient under-treatment, it is recommended to surgically remove such diagnosed tumour-like lesion as part of therapy.

**Keywords:** radial scar, infiltrating epitheliosis, complex sclerosing lesion.

### Abstrakt

**Úvod:** Nádory prsníka tvoria heterogénnu skupinu lézií s variabilným klinickým a morfologickým obrazom prezentácie. Medzi nádormi prsníka existujú lézie, ktoré vykazujú hraničné morfologické a klinické rysy a ležia v šedej zóne medzi benignymi a malígnymi léziami a ich správanie sa nedá jednoznačne odhadnúť. Morfologická kategorizácia týchto lézií je veľmi náročná, často subjektívna a vedie k rôznym diagnózam, ktoré sú spúšťačom nad- alebo pod liečenia pacientov. Pomoc v rámci porozumenia týchto lézií nám dáva progresívne rozvíjajúca sa molekulárna biológia, ktorej výsledky môžu, ale aj nemusia sa prejavíť v odhade klinického správania sa týchto lézií.

**Súčasný stav problematiky:** Zhubné nádory prsníka sa prejavujú širokou škálou diferenciácie resp. fenotypickou rozmanitostou, ktorých základ je v zapojení rôznych patologických molekulových signálnych dráh. Existujú lézie, ktoré sú charakterizované nejednoznačným histologickým obrazom, vykazujú malígne histomorfologické zmeny, ale majú výrazne limitovaný metastatický potenciál.

**Infiltrujúca epitelióza:** Infiltrujúca epitelióza (IE) je zriedkavou komplexnou sklerotizujúcou léziou (CSL) prsníka charakterizovaná infiltrujúcimi vývodmi zanorené v sklerotickej stróme. Vývody sú vystlané bunkami, ktoré cytomorfologicky a architektonicky imituju bunky v rámci pravidelnej duktovej hyperplázie (UDH). Vo väčšine prípadov IE sa nachádza v teréne alebo susedstve typickej duktovej hyperplázie (UDH), papilómu, mikropapilárneho duktového karcinómu *in situ*, low grade adenosquamózneho karcinómu. V dnešnej dobe v podstate celosvetovo - aj skúsený mammopatológovia IE zaradujú do skupiny lézií radiálnej jazvy (RS) / komplexných sklerotizujúcich lézií (CSL) prsníka. V podstate do dnešného dňa neboli jednoznačne publikovaný prípad, kde by jednoznačne určili benígnu alebo malígnu povahu lézie, preto v dnešnej dobe infiltrujúca epitelióza sa definuje ako prsníková lézia s neistým malígnym potenciálom. V rámci korektnej diagnostiky veľmi dôležitá je histopatologická, imunohistochemická analýza infiltrujúcej epiteliózy, ktorej rozmanitosť ozrejmujú nedávno vykonané genetické analýzy.

**Záver:** Infiltrujúca epitelióza patrí medzi zriedkavé nádorové lézie prsníka. Z hľadiska výsledkov porovnávajúcich imunohistochických vyšetrení a genetickej analýzy môžeme povedať, že IE je klonálna – neoplastická lézia – v podstate je proliferatívnym „koncom“ spektra lézií RS/CSL. Vykonané genetické analýzy naznačujú, že infiltrujúca epitelióza môže byť substrátom, z ktorého môže vzniknúť duktálny karcinóm in situ a low-grade adenosquamózny karcinóm prsníka. V rámci prevencie pod liečenia pacientov sa odporúča v procese terapie chirurgické odstránenie takto diagnostikovanej tumoróznej lézie.

**Kľúčové slová:** radiálna jazva, infiltrujúca epitelióza, komplexná sklerotizujúca lézia.

## INTRODUCTION

Breast cancer forms a heterogeneous group of lesions with variable clinical and morphological presentations. A large portion of lesions are traditionally classified as benign or malignant and their behavior can be estimated quite precisely. However, there are still lesions with borderline morphological and clinical features which exist in the grey zone between benign and malignant lesions and their behavior cannot be estimated clearly. The morphological categorization of such lesions is very demanding, often subjective, and results in various diagnoses that trigger patient over- or under-treatment. Another problem is that these lesions are literally seldom and morphological and clinical data are often insufficient and limit the assessment of the prognosis of such lesions. Progressively developing molecular biology offers some support in understanding these lesions. Results in this field may or may not be manifested in the estimation of the clinical behavior of these lesions. The conception of these lesions situated in the “grey zone” includes breast lesions with unclear malignant potential and breast lesions with a limited metastasizing potential. Breast lesions with unclear malignant potential include in particular mammary cylindroma, atypical microglandular adenosis, mammary pleomorphic adenoma, and infiltrating epitheliosis. Breast lesions with limited metastasizing potential include in particular low-grade adenosquamous carcinoma, low-grade fibromatosis-like spindle cell carcinoma, encapsulated papillary carcinoma, borderline phyllodes tumor, and atypical adenomyoepithelioma.

## CURRENT STATE OF THE SUBJECT

Mammary gland cells feature high-degree phenotypic plasticity, which is manifested in the diverse morphology of lesions in a normal breast, reactive lesions, and in hyperplastic and neoplastic lesions. In a normal breast, the methods of molecular genetics have proven various subtypes of cells, such as mature luminal/gland cells and myoepithelial cells, as well as basal stem/progenitor cells and luminal progenitor cells. A normal breast epithelial cell may differentiate in various ways – by apocrine, clear cell, squamous, sebaceous, mucinous differentiation, and undergoing hyper-secretion changes during lactation (Rakha et al. 2016). Cells participating in these changes do not express hormone receptors. Myoepithelial cells may also undergo various morphological differentiation, namely epithelioid, spindle cell, myoid, or clear cell. As part of the aberrant differentiation of myoepithelial cells, a

morphological picture of collagenous spherulosis is developed in hyperplastic lesions. Aberrant stromal changes are present both in benign and malignant breast lesions. At present, we know that malignant breast cancer manifests a wide range of differentiation or phenotypic diversity, which is based on the engagement of various pathological molecular signal pathways. In malignant epithelial breast lesions, the presence of myoepithelial cells and the basal membrane on the stromal interface are usually an indication of carcinoma in situ that has no metastasizing potential. Malignant epithelial cells infiltrating the surrounding connective tissue or the tumor stroma without the provable presence of myoepithelial cells are diagnosed as invasive carcinomas with metastasizing potential. However, there are lesions which are characterized by ambiguous histological findings or which are a certain intermediate between benign and malignant breast lesions, and lesions that manifest malignant histomorphological changes, but have a very limited metastasizing potential. The diagnostic classification of these lesions and further medical and nurse care resulting from such classification is therefore very demanding. This uncertainty may lead to the over- or under-treatment of a patient with the same lesion. Lesions that can be divided into two groups are included in this concept. The first group consists of breast lesions with a biologically and/or histologically clearly invasive phenotype without metastasizing potential or with a very low metastasizing potential. The second group includes lesions with unclear malignant potential that carry certain characteristics of a malignant phenotype, such as tumor infiltrating front without the presence of peripheral myoepithelial cells, but with core or cell atypia, without lymphovascular invasion, and without evidence of metastasis formation. The first group contains lesions from the group of basal-like/metaplastic carcinoma, such as low-grade adenosquamous carcinoma, low-grade fibromatosis-like spindle cell carcinoma, encapsulated papillary carcinoma, borderline phyllodes tumor, and atypical adenomyoepithelioma. The second group contains in particular mammary cylindroma, atypical microglandular adenosis, mammary pleomorphic adenoma, and infiltrating epitheliosis. Following surgical removal, the potential relapse of these lesions cannot be excluded with certainty.

### ***Infiltrating epitheliosis***

Infiltrating epitheliosis (IE) is a rare complex sclerosing lesion (CSL) of the breast characterized with infiltrating ducts immersed in the sclerotic stroma. The ducts are lined with cells that in terms of their cytomorphology and architecture mimic cells in usual ductal hyperplasia (UDH). In most cases, IE is located within or next to a usual ductal hyperplasia (UDH), papilloma, micropapillary ductal carcinoma in situ, low-grade adenosquamous carcinoma. Nowadays, on a global level, even experienced mammary pathologists assign IE to the group of radial scar (RS) lesions/complex sclerosing lesions (CSL) of the breast. Incidence of carcinoma development from RS/CSL lesions is not exactly known. The incidence of RS/CSL itself is 4.7 – 8.2%, and in the long-term monitoring of the incidence of carcinoma development from such lesions, such incidence is 1.5 times higher than development from other competing proliferative lesions. RS/CSL is present in 3.6 - 32% of all carcinomas. The association between CSL and another type of breast carcinoma, e.g. low-grade metaplastic carcinoma, is very small (Carey et al. 2006).

In practice, the infiltrating epitheliosis is characterized by infiltrating solid (non-glandular) islets, nests or ducts, duct-like structures within the scleroelastotic stroma (Figure 1). In terms of cytomorphology and immunohistochemistry, the proliferating epithelial cells resemble cells which are typical in the case of ductal hyperplasia. Due to the infiltrating morphological picture and mostly missing peripheral myoepithelial cells, the finding is close to the invasive low-grade malignant tumor with morphological similarities that can be seen as part of low-grade adenosquamous carcinoma (Figure 2). On the other hand, the immunology profile, benign cell and core features, missing carcinoma in situ, and rare focal presence of peripheral myoepithelial cells make IE part of benign hyperplastic processes. No clear case determining the benign or malignant nature of the lesion has been published to date; therefore, the infiltrating epitheliosis is currently defined as a breast lesion with uncertain malignant potential (Rakha et al. 2006).

In historical terms, infiltrating epitheliosis was described for the first time by John Azzopardi in 1979. Initially, it was described as sclerosing adenosis with pseudoinfiltration and sclerosing papillary proliferation. These descriptive terms were inaccurate; therefore, Eusebi and Millis described the exact histomorphological characteristics of the lesion, which included the following (Carey et al. 2006):

1. Larger part of the lesion consists of florid epitheliosis, focally often of a squamoid appearance. Ducts in the lesion are irregular with a zig-zag shape. Proliferated epithelial cells at some points virtually blend with the surrounding stroma, imitating epithelial-mesenchymal transformation or makeover.
2. Scleroelastotic stromal changes all over the lesion with the formation of epithelial foci at various points of the lesion. Less frequent is a typical central sclerotic focus or nidus, like in the complex radial scar (RS) or in the complex sclerosing lesions where proliferation is mainly present on the periphery.
3. Frequent desmoplastic stromal response and the presence of so-called keloid-like fibrous stripes.

Based on these changes, Eusebi and Millis, in terms of histomorphology, later considered infiltrating epitheliosis (IE) rather an infiltrating lesion than a typical ductal hyperplasia or various forms of typical sclerosing lesions; therefore, the invasive carcinoma comes first in the differential diagnostics and at present we must ask the basic question: is infiltrating epitheliosis a hyperplastic or neoplastic process? Can it be distinguished from RS/CSL? What to advise a clinician: to monitor or operate?

**Histopathological analysis of infiltrating epitheliosis (IE):** IE occurs exclusively in women, most frequently around the age of 60 and usually on one side. It is a tumor-forming lesion, usually 0.3 - 2.1 cm in size. Histomorphologically, it consists of infiltrating ducts filled with typical hyperplastic epithelial lesions with some epithelial nests on the periphery having irregular edges – a zig-zag shape – and some proliferating cells freely blended with the surrounding stroma, creating an infiltrating appearance, elsewhere of a squamoid appearance. There are solid (non-glandular) epithelial proliferations with intranuclear inclusions resembling a typical ductal hyperplasia. The epithelial proliferation may also have a papillar architecture and may be associated with traditional ductal hyperplasia, low-grade

micropapillary carcinoma in situ and papilloma. The tumor stroma may be desmoplastic, scleroplastic or even myxoid. The stroma may contain keloid-like fibrous stripes.

**Immunohistochemical analysis of infiltrating epitheliosis:** IE has a heterogeneous epithelial phenotype: basal - intermediary, CK5/6-positive cells and Er receptor-positive/negative and CD117-positive luminal epithelial cells. Myoepithelial cells with discontinuing positivity (+/-) or p63-negative, actin-abnormal design in most IEs. UDH is not identical to IE, since when we compare the phenotype of both lesions, IE has a discontinuing or missing peripheral myoepithelial layer (Carey et al. 2006).

**Genetic analysis of infiltrating epitheliosis:** all exons of the 254 genes participating in the regulation of the signal DNA repair pathway have been investigated using a targeted massive sequential analysis. They were all related to the phosphatidylinositol-3-kinase (PI3K) gene. The PI3K-signalling pathway ensures proliferation, normal cell survival, and migration in a physiological way. Mutations of the PI3-K-signalling pathway have been also documented in the typical ductal hyperplasia, papilloma, and columnar lesions. It is assumed that PIK3CA mutations in these lesions are rather responsible for proliferative changes than for the malignant transformation of the glandular epithelium of the breast (Carey et al. 2006). As part of a genetic analysis it has been found out that in 63.6% of cases, the RC/CSL contain activating mutations of PIK3CA and the percentage is even higher in lesions (up to 83.3%) which contain epithelial atypias. Generally activating somatic PIK3CA mutations are the second most frequently mutated gene in breast cancer. Usually, they are mutations of tyrosine-kinase and tyrosine-phosphatase genes (Carey et al. 2016). PIK3CA is a 34 kb gene located on chromosome 3q.26.3 that consists of 20 exons coding for 1068 amino acids yielding for a 124 kDa size protein. The mutations are related to the coding area of the p110 $\alpha$  catalytic subunit of the phosphatidylinositol-3-kinase (PI3K) (Pixu et al. 2009; Ligresti et al. 2009).

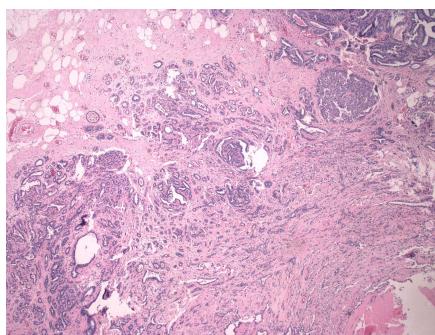
Mutations of the PI3K signaling pathway in low-grade/Er receptor  $^+$  breast cancer are confirmed in 25 - 50% of cases. Similarly, the mutation of PIK3CA, H1047R with additional ERBB3 mutation has been detected as part of invasive epitheliosis (IE) - papilloma association. The most frequently mutated exons (the so-called hot-spot mutations) in genetic analyses of invasive epitheliosis-type lesions were 7, 9 (in the helical domain) and 20 (in the kinase domain). They were somatic mutations of PI3K. It has been determined that in all cases of IE, there were mutations of PIK3CA, PIK3R1. Some mutations overlapped with the so-called hot-spot mutations of H1047R (in exon 20) and E542 (in exon 9) (Ligresti et al. 2009). In addition, SF3B1 mutations have also been detected.

PIK3CA and SF3B1 mutations are also present in lesions such as ductal carcinoma in situ, low-grade adenosquamous breast cancer (LGASC), which have a similar phenotype as the invasive epitheliosis (IE): Er receptor-negative, CK5/6-positive. These mutations indicate that IE and DCIS are clonal in nature and their constitution enables them to serve as a substrate for the development of LGASC, or it is accordance with the opinion that IE may form a substrate for the development of DCIS and LGASC (Carey et al. 2016).

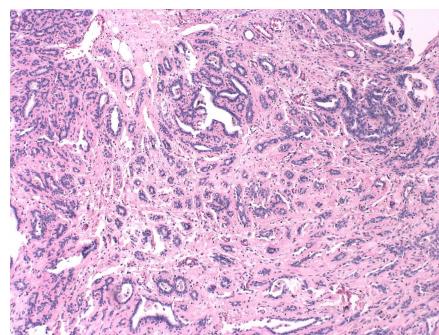
On the other hand, immunohistochemical low-grade breast carcinoma is Er receptor-positive and CK5/6-negative and the infiltrating epitheliosis is CK5/6-positive and Er

receptor-heterologously positive or negative. In spite of that, it is obvious from what has been said above that infiltrating epitheliosis (IE) develops because of the activation of a PI3K mutation and therefore is a clonal neoplasm, but has a different evolution pathway than Er receptor-positive low-grade carcinoma.

As far as genetic analyses of lesions where UDH and IE have been associated are concerned, PIK3CA, C420K mutations have been detected in the area of usual ductal hyperplasia (UDH). This revolutionary finding indicates that UDH and IL are not clonally associated and have a convergent phenotype; PI3K has been activated by means of different somatic genetic mutations (Carey et al. 2016).



**Figure 1** Infiltrating epitheliosis,  
H&E, 40x



**Figure 2** Infiltrating epitheliosis,  
H&E, 100x

## CONCLUSION

Infiltrating epitheliosis is a rare breast cancer lesion. In terms of the results comparing immunohistochemical examinations and genetic analysis, it can be stated that IE is a clonal, neoplastic lesion. It is basically a proliferative “ending” of the RS/CSL lesion range. UDH and IL are not clonally associated and have a convergent phenotype; as far as UDH and infiltrating epitheliosis are concerned, PI3K is activated by means of different somatic genetic mutations (Carey et al. 2016). The low-grade breast carcinoma is Er receptor-positive and CK5/6-negative, infiltrating epitheliosis is CK5/6-positive and Er receptor-heterologously positive or negative; therefore, it does not have the same evolutional pathway as Er receptor-positive low-grade carcinoma. PIK3CA and SF3B1 mutations indicate that infiltrating epitheliosis (IE) may serve as a substrate for the development of a ductal carcinoma in situ (DCIS) and low-grade adenosquamous breast cancer (LGASC). Based on the knowledge conveyed by modern morphological, immunohistochemical, and genetic facts as part of the medical care for infiltrating epitheliosis and the prevention of patient under-treatment, it is recommended to surgically remove this diagnosed tumor-like lesion as part of the therapy.

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## OBESITY AS A CIVILIZATION DISEASE AND RISK FACTOR FOR BREAST CANCER

### OBEZITA AKO CIVILIZAČNÉ OCHORENIE A ZÁROVEŇ AKO RIZIKOVÝ FAKTOR VZNIKU KARCINÓMU PRSNÍKA

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#### Abstract

**Introduction:** Obesity belongs to civilization diseases and is a risk factor for the occurrence of a number of serious diseases, including colon and breast carcinoma. At present, the effect of endogenous estrogen on breast cancer is examined.

**Core:** We rely on an overview of known risk factors for breast cancer, hormone factors, and estrogen release from adipose tissue. The aim of the work is to clarify the hormonal mechanisms and to contribute to the understanding of the effect of estrogen on the development of breast carcinoma. Secondary prevention could be more effective in preventing breast cancer, especially in menopausal and postmenopausal women. Estrogen has a wide range of secondary metabolites. These secondary metabolites affect all estrogen-sensitive tissues, including breast. They act on them by stimulating estrogen receptors (ER), leading to the activation of estrogen-sensitive DNA genes. These genes are involved in cell growth, proliferation, apoptosis and carcinogenesis. The mammary gland epithelial cells respond to estrogens produced by aromatase in fatty tissue, including the stromal component of the breast itself. Epidemiological studies show that the long-term effect of estrogen increases the risk of malignant breast cancer, as well as benign breast cancer.

**Discussion:** The topic of breast cancer and its etiopathogenesis, the possible influencing of factors should be constantly studied. This work incorporates as much knowledge as possible from different studies, but it is not easy to clarify this issue at all. Studies on estrogens are unclear in conclusions. Most of them, however, point to the harmful effects of estrogens on breast cancer. This issue is relatively young and therefore no clear conclusion can be reached. The amount of the study is still ongoing and is not over. The study, which was conducted to suspect an increased risk of breast cancer in patients taking HRT, suggests that estrogen has a significant effect on the development of breast cancer. Based on these findings, more attention has been paid to estrogen.

**Conclusion:** Currently, many risk factors are known, including abdominal obesity among the most important. This causes the release of endogenous estrogens and other health complications. Therefore, it is of utmost importance to understand the relationship between obesity in postmenopausal women and the development of breast cancer and, in particular, to target risk patients aged 50-70 years. Care should be taken

not only to inform elderly people to understand the importance of regular prenatal visits and to understand the importance of a healthy lifestyle.

**Keywords:** Obesity. Breast cancer. Endogenous estrogen. Prevention.

### Abstrakt

**Úvod:** Obezita patrí k civilizačným ochoreniam a je rizikovým faktorom pre vznik množstva závažných ochorení, K nim patrí aj karcinóm hrubého čreva a karcinóm prsníka. V súčasnej dobe sa skúma vplyv endogénneho estrogénu na vznik karcinómu prsníka.

**Jadro:** Opierame sa o prehľad známych rizikových faktorov vzniku karcinómu prsníka, hormonálnych faktoroch a o uvoľňovaní estrogénu z tukového tkaniva. Cieľom práce je ozrejmiť hormonálne mechanizmy a prispeť k pochopení vplyvu estrogénu na vznik karcinómu prsníka. V rámci sekundárnej prevencie by sa mohlo účinnejšie predchádzat' vzniku karcinómu prsníka predovšetkým u menopauzálnych a postmenopauzálnych žien. Estrogén má široké spektrum sekundárnych metabolítov. Tieto sekundárne metabolity ovplyvňujú všetky estrogén-senzitívne tkanivá, vrátane prsníka. Pôsobia na ne prostredníctvom stimulácie estrogénových receptorov (ER), čo vedie k aktivácii estrogén-senzitívnych génov DNA . Tieto gény sa zúčastňujú na procese bunkového rastu, proliferácie, apoptózy a karcinogenézy. Epitelové bunky mliečnej žľazy reagujú na estrogény, ktoré vznikajú za pomoci aromatáz v tukovom tkanive, a to vrátane stromálnej zložky samotného prsníka. Epidemiologické štúdie dokazujú, že dlhodobé pôsobenie estrogénu zvyšuje riziko vzniku zhoubných nádorov prsníka, ale aj benígnych nádorov prsníka.

**Diskusia:** Tému karcinómu prsníka a jeho etiopatogenézu, možné ovplyvňovanie faktorov, je potrebné neustále študovať. V tejto práci je zahrnutých čo najviac poznatkov z rôznych štúdií, no napriek tomu vôbec nie je jednoduché ozrejmiť túto problematiku. Štúdie ohľadom estrogénov nie sú jednoznačné v záveroch. Väčšina z nich ale poukazuje na škodlivý vplyv estrogénov na karcinóm prsníka. Táto problematika je pomerne mladá a preto nie je možné dôjsť k jednoznačnému záveru. Množstvo štúdií ešte stále prebieha a nie sú ukončené.

Zo štúdií, ktoré boli vykonané kvôli podozreniu na zvýšené riziko karcinómu prsníka, u pacientok užívajúc HRT, vyplýva, že estrogén má výrazný vplyv na vznik karcinómu prsníka. Na základe týchto zistení sa začala venovať väčšia pozornosť estrogénu.

**Záver:** V súčasnej dobe sú známe mnohé rizikové faktory, medzi ktoré sa, ako z najdôležitejších, zaraduje abdominálna obezita. Táto totižto spôsobuje uvoľňovanie endogénnych estrogénov a ďalších zdravotných komplikácií. Preto je nesmierne dôležité pochopiť súvislosti medzi obezitou u žien po menopauze a vznikom karcinómu prsníka a najmä sa zamerať na rizikové pacientky vo veku 50-70 rokov. Treba dbať na informovanosť nielen starších ľudí, aby chápali aké je dôležité pravidelné absolvovanie preventívnych prehliadok a aby rozumeli významu zdravého životného štýlu.

**Kľúčové slová:** Obezita, karcinóm prsníka, endogénny estrogen, prevencia.

## 1 INTRODUCTION

All over the world, breast cancer remains a major issue for public health. Increasing numbers of new cases and deaths are observed in both developed and less developed countries, only partially attributable to the increasing population age. In the 28 member states of the European Union, there were 361,608 new breast cancer cases in 2012 and these are estimated to have increased to 373,733 in 2015 (+3.4 %); deaths were 91,585 and 95,357, respectively (+4.1 %) (Sardanelli et al. 2017). No major differences in this trend can be appreciated across European countries. However, in 2006–2012 the mortality for larger tumours remained greater than that for smaller tumours, significantly for the comparison of T1c and T1a stage, and was independent from nodal status.

## 2 OBESITY

Obesity is a growing global health problem all over the world. The prevalence of obesity has been increasing globally over the past decades, resulting today in over 600 million adults worldwide with a BMI of  $30 \text{ kg/m}^2$  or greater (Finucane et al. 2011; Stevens et al. 2012). By 2030, the number of overweight and obese adults is projected to reach 2.16 and 1.12 billion, respectively, accounting for 57.8% of the world's adult population (Kelly et al. 2008). Recent data demonstrate that the age-adjusted obesity ( $\text{BMI} \geq 30.0 \text{ kg/m}^2$ ) prevalence in USA is 34.9% among all adults age 20 years and older while that for overweight plus obesity ( $\text{BMI} \geq 25.0 \text{ kg/m}^2$ ) is 68.5% (Ogden et al. 2014). More recently, the 2012 Annual Report to the Nation on Cancer (Eheman et al. 2012) concluded that overweight and obese women have a relative risk for postmenopausal breast cancer of 1.13 and 1.25, respectively vs. normal weight women (Neuhouser et al. 2015).

## 3 ETIOLOGY OF BREAST CANCER

The cause of breast cancer is multifactorial and includes hormonal, genetic and environmental causes (Gerard et al. 2017). The association between obesity and breast cancer risk is complex and can be different depending on menopausal status, the use of postmenopausal therapy, breast cancer subtype and racial/ethnic group (Suzuki et al. 2009). However, there is abundant and consistent epidemiological evidence suggesting that obesity is associated with a higher risk of developing breast cancer in postmenopausal women, particularly for the hormone-dependent subtype of breast cancer (Gerard et al. 2017). Obesity, which is characterized by an excess accumulation of body fat, is at the origin of chronic inflammation of white adipose tissue and is associated with dramatic changes in the biology of adipocytes leading to their dysfunction. Inflammatory factors found in the breast of obese women considerably impact estrogen signaling, mainly by driving changes in aromatase expression the enzyme responsible for estrogen production, and therefore promote tumor formation and progression. There is thus a strong link between adipose inflammation and estrogen biosynthesis and their signaling pathways converge in obese patients (Jatoi et al. 2016).

The development of breast cancer cells is linked to hypoxia. The hypoxia-induced factor HIF-1 $\alpha$  influences metastasis through neovascularization. Hypoxia seems to decrease the responsiveness to hormonal treatment due to loss of estrogen receptors (ERs). Obesity is discussed to increase hypoxia in adipocytes, which promotes a favorable environment for tumor cells in mammary fat tissue, whereas, tumor cells profit from good oxygen supply and are influenced by its deprivation as target regions within tumors show (Rausch et al. 2017).

#### 4 OBESITY AND BREAST CANCER

Neuhouser et al. (2015) investigated in their study the associations of overweight and obesity with risk of postmenopausal invasive breast cancer after extended follow-up in the Women's Health Initiative clinical trials. Women who were overweight and obese had an increased invasive breast cancer risk vs women of normal weight. Risk was greatest for obesity grade 2 plus 3 (body mass index - BMI > 35.0; hazard ratio (HR) for invasive breast cancer, 1.58; 95% CI, 1.40-1.79). A BMI of 35.0 or higher was strongly associated with risk for estrogen receptor-positive and progesterone receptor-positive breast cancers (HR, 1.86; 95% CI, 1.60-2.17) but was not associated with estrogen receptor-negative cancers. Obesity grade 2 plus 3 was also associated with advanced disease, including larger tumor size (HR, 2.12; 95% CI, 1.67-2.69; P = 0.02), positive lymph nodes (HR, 1.89; 95% CI, 1.46-2.45; P = 0.06), regional and/or distant stage (HR, 1.94; 95% CI, 1.52-2.47; P = 0.05), and deaths after breast cancer (HR, 2.11; 95% CI, 1.57-2.84; P < 0.001). Women with a baseline BMI of less than 25.0 who gained more than 5% of body weight over the follow-up period had an increased breast cancer risk (HR, 1.36; 95% CI, 1.1-1.65), but among women already overweight or obese we found no association of weight change (gain or loss) with breast cancer during follow-up. There was no effect modification of the BMI-breast cancer relationship by postmenopausal hormone therapy, and the direction of association across BMI categories was similar for never, past, and current hormone therapy use.

Grill et al. (2017) analysed in their study the relationship of the seemingly harmful lifestyle factors such as nicotine and alcohol indulgence, obesity, and physical inactivity, as well as a low socioeconomic status and increased cancer prevalence in a cohort of BRCA 1 and 2 mutation carriers. Study participants indicating a higher physical activity during their adolescence showed a significantly lower cancer prevalence (p = 0.019). A significant difference in cancer occurrence authors observed in those who smoked prior to the disease, and those who did not smoke (p < 0.001). Diseased mutation carriers tended to have a lower BMI compared to non-diseased mutation carriers (p = 0.079), whereas non-diseased revealed a significantly higher physical activity level than diseased mutation carriers (p = 0.046). Based on obtained data authors suggested that smoking and low physical activity during adolescence are risk factors for developing breast cancer in women with BRCA1 or BRCA2 mutation. Obesity may negatively affect survival in breast cancer, but studies are conflicting, and associations may vary by tumour subtypes and race/ethnicity groups.

Liu et al. (2017) identified 273 women with invasive breast cancer administered Adriamycin/Taxane-based neoadjuvant chemotherapy from 2004 to 2016 with BMI data at diagnosis. Obesity was defined as BMI  $\geq 30$ . Associations between obesity and event-free survival (EFS), using STEEP events, and overall survival (OS), using all-cause mortality,

were assessed overall and stratified by tumour subtype [Hormone Receptor Positive (HR+)/HER2-, HER2+, and Triple-Negative Breast Cancer (TNBC)] in our diverse population. Overall, obesity was associated with worse EFS (HR 1.71, 95% CI 1.03-2.84, p = 0.04) and a trend towards worse OS (p = 0.13). In HR+/HER2- disease (n = 135), there was an interaction between obesity and hormonal therapy with respect to OS but not EFS. In those receiving tamoxifen (n = 33), obesity was associated with worse OS (HR 9.27, 95% CI 0.96-89.3, p = 0.05). In those receiving an aromatase inhibitor (n = 89), there was no association between obesity and OS. In TNBC (n = 44), obesity was associated with worse EFS (HR 2.62, 95% CI 1.03-6.66, p = 0.04) and a trend towards worse OS (p = 0.06). In HER2+ disease (n = 94), obesity was associated with a trend towards worse EFS (HR 3.37, 95% CI 0.97-11.72, p = 0.06) but not OS. Race/ethnicity was not associated with survival in any subtype, and there were no interactions with obesity on survival. Based on their results authors suggested that obesity may negatively impact survival, with differences among tumour subtypes.

## 5 CONCLUSION

Previous studies have indicated that obesity is one of the risk factors for postmenopausal women with breast cancer; in addition, weight gain is associated with poor prognosis of premenopausal breast cancer. However, the exact pathogenesis of obesity in the occurrence and development of breast cancer is still unclear. Currently, many risk factors are known, including abdominal obesity among the most important. This causes the release of endogenous estrogens and other health complications. Therefore, it is of utmost importance to understand the relationship between obesity in postmenopausal women and the development of breast cancer and, in particular, to target risk patients aged 50-70 years. Higher attention should be taken to informing (not only) the women to understand the importance of regular prenatal visits and to understand the importance of a healthy lifestyle.

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## Conflict of interests

The authors whose names are listed in the title of the article certify that they have NO affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, or other equity interest), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

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## IMPACT OF REHABILITATION AND HYPERBARIC OXYGEN THERAPY IN A PATIENT WITH A ISCHEMIC STROKE

### VPLYV REHABILITAČNEJ LIEČBY A HYPERBARICKEJ OXYGENOTERAPIE U PACIENTA S NCMP

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#### Abstract

**Introduction:** Increased O<sub>2</sub> concentration in the body, together with higher pressure, acts in a complex way, which in combination with higher pressure gives HBOT unique therapeutic options. HBOT stimulates aerobic metabolism, i. the formation of ATP molecules, reduces lactate production, eliminates local acidosis, allows for greater diffusion of oxygen into the tissues, bactericidal effects on anaerobic bacteria, promotes angiogenesis, regenerates nerve cells, reduces edema, and many others. In some diseases, HBOT is the foundation of a life-saving treatment, many of which are an important addition to other treatment methods. HBOT, however, focuses particularly on cases where conventional therapies fail to treat some diseases. However, the curative effect is not immediate, but it does not begin to manifest in patients until after a while. The number of exposures ranges between 10-30 and the duration of one exposure is approximately 90 minutes. The effect of HBOT on the individual organism differs in general from many factors, including, the pressure used, the length of exposure and the health of the individual, but also the biological variability of the organism.

**Methods and material:** The pilot study examines the relationship between restoration of the patient's functional functions after NCMP and rehabilitation treatment combined with hyperbaric oxygen therapy. The set consisted of 1 patient after overcoming NCMP. The data and data needed to prepare a pilot study during the patient's therapy from 31.6.2017 to 5.8.2017 in the Physical Hospital Trenčín and HBO were provided by input and output kinesiological analysis and functional independent measure.

**Results:** In our pilot statistics, we confirmed the entry and exit examinations: SFTR flexion joint flexion 30 ° abduction 10 °, flexion joint 50 ° flexion and 20 ° flexion joint. At the paretic lower limb, mobility was improved in the hip joint by flexion of 10 ° and extension by 5 °. The knee joint is flexed by 30 °. Ankle joint with flexion 10 ° and extension 30 °. Muscle strength according to the Jade Muscle Test was increased by 0.5 to 1 degree after the therapy on the upper and lower paretic limbs. In the FIM test, we had an improvement of 30 points. In the subjective examination of the pain of the paretic upper limb in the extreme pain scale ranges from 0-10 drop in pain from Grade 8 to Grade 3.

**Conclusion:** The results point to the fact that the relationship between rehabilitation treatment in combination with hyperbaric oxygenoterapia and spasticity which significantly positively affects the patient's functional function. The importance of rehabilitative treatment and hyperbaric oxygen therapy is perceived by the patient as self-sufficient and self-serving as the most serious handicap in his/her current life since the onset of the disease.

**Key words:** Hyperbaric Oxygen Therapy. Stroke. Physiotherapy.

### Abstrakt

**Úvod:** Zvýšená koncentrácia O<sub>2</sub> v organizme spolu s vyšším tlakom pôsobia komplexne, čo v kombinácií s vyšším tlakom dáva HBOT unikátne terapeutické možnosti. HBOT stimuluje aeróbny metabolizmus, t.j. tvorbu molekúl ATP, znižuje tvorbu laktátu, eliminuje lokálnu acidózu, umožňuje väčšiu difúziu kyslíka do tkanív, má baktericídny účinok na anaeróbne baktérie, podporuje angiogenézu, regeneruje nervové bunky, redukuje edém a mnoho ďalších. Pri niektorých ochoreniach je HBOT základom život zachraňujúcej liečby, u mnohých je významným doplnkom ďalších liečebných metód. Na HBOT sa však sústredí pozornosť najmä v prípadoch, kde pri liečbe niektorých ochorení zlyhávajú konvenčné terapeutické postupy. Liečebný efekt však nie je okamžitý, ale u pacientov sa začína prejavovať až po určitej dobe. Počet expozícií sa pohybuje medzi 10-30 a trvanie jednej expozície je približne 90 minút. Efekt HBOT na organizmus jedincov sa líši vo všeobecnej závislosti od mnohých faktorov, medzi ktoré patrí napr. použitý tlak, dĺžka expozície a zdravotný stav jedinca, ale aj biologická variabilita daného organizmu.

**Metodika a materiál:** Pilotná štúdia rozoberá vzťah medzi obnovením pohybových funkcií pacienta po náhlej cievnej mozgovej príhode (NCMP) a rehabilitačou liečbou kombinovanou s hyperbarickou oxygeno-terapiou. Súbor tvoril 1 pacient po prekonaní NCMP. Údaje a dáta potrebné pre vypracovanie pilotnej štúdie počas terapie pacienta od 31.6.2017 do 5.8.2017 vo Fakultnej nemocnici Trenčín a HBO sme zabezpečovali prostredníctvom vstupného a výstupného kineziologického rozboru a FIM testom (functional independent measure).

**Výsledky:** V našej pilotnej štatistike sme potvrdili pri porovnaní vstupného a výstupného vyšetrenia: SFTR zlepšenie v ramennom klíbe vo flexii o 30°, v abdukcii o 10°, v laktovom klíbe vo flexii o 50° a zápästnom klíbe o 20°. Na paretickej dolnej končatine sa pohyblivosť zlepšila v bedrovom klíbe vo flexii o 10° a extenzii o 5°. V kolennom klíbe vo flexii o 30°. V členkovom klíbe vo flexii o 10° a extenzii o 30°. Svalová sila podľa Jandového svalového testu bola po terapii zvýšená o 0,5 až 1 stupeň na hornej aj dolnej paretickej končatine. Vo FIM teste sme zaznamenali zlepšenie o 30 bodov. Pri subjektívnom vyšetrení bolesti paretickej hornej končatiny v krajných polohách škále bolesti od 0-10 pokles bolesti zo stupňa 8 na 3 stupeň.

**Záver:** Výsledky poukazujú na skutočnosť, že vzťah medzi rehabilitačou liečbou v kombinácií s hyperbarickou oxygenoterapiou a spasticitou, ktorá významné pozitívne ovplyvňuje pohybovú funkciu pacienta. Význam rehabilitačnej liečby a hyperbarickej oxygenoterapie pacient vníma ako veľký z hľadiska sebestačnosti a sebaobsluhy, ktoré

považoval od začiatku ochorenia ako najzáväznejší hendiķep vo svojom terajšom živote.

**Kľúčové slová:** Hyperbarická oxygenoterapia. Kineziologické vyšetrenie. Fyzioterapeutický plán.

## INTRODUCTION

The risk of disability after overdose of stroke - cerebrovascular accident (CVA) is high. Therefore, CVA treatment must be started as soon as possible after the onset of the event. Early diagnostics, intensive care, prevention, the treatment of complications and early comprehensive rehabilitation can favourably affect the patient's endpoint (Gúth 2006; Angerová 2013).

The symptoms of the patient after overcoming CVA consist mainly of a change in muscle tone, as a result of which the so- Wernicke-Mann holding. Typical tendency is to tender contract in the elbow and hand, to adduction in the shoulder joint, to extensive contraction of the lower limb with equilibrium position of the foot (Pfeiffer 2007). Spasticity arises, resulting in a significantly deteriorated quality of life for the patient. It occurs in about 30% of patients with CVA, most often after cerebral ischemic CVA. Most commonly, the spasticity of the upper limb of the lesion and the lower limb of the extension type is present. Spasticity aggravates patient mobility, restrains it in normal daily activities, and aggravates its quality of life and the severity of health care (Cibulčík 2015).

One of the possibilities of vascular stroke therapy as an additive treatment is hyperbaric oxygen therapy (HBOT). HBOT is a therapeutic approach where the patient is exposed to 100% oxygen at pressures higher than ambient (1 ATA). This leads to an increased blood oxygen level, which can penetrate to ischemic areas more deeply than under normobaric conditions (Jain 2009; Krajčovičová et al. 2014; Zigo et al. 2017; Gerlichová et al. 2014). Preclinical research shows that HBOT exerts a neuroprotective effect against hemorrhagic brain injuries (Hu et al. 2016; Beynon et al. 2012). The impact of HBOT on the brain water content and other indices, reveals a higher effectiveness of the post-treatment approach involving moderate pressures of oxygen (~2 ATA). The robust brain-protective effects of HBOT for hemorrhagic injuries, not limited to relief from hypoxia, may justify its use for hemorrhagic stroke, which awaits verification in clinical trials (Ostrowski et al. 2017).

## AIM

Based on a case report of patient with post-ischemic CVA, to present the effect of HBOT in combination with intensive rehabilitation and routine pharmacotherapy.

## METHODOLOGY

The study methodology was a case study of overdosed ischemic stroke CVA with a complicated course treated with standard pharmacotherapy, rehabilitated and at a time interval of 1.5 years after CVA overdose, when improvements in multiple functions were not

observed under intensive physiotherapeutic interventions, treated with HBOT. Oral and written information about the study was provided, and informed consent from the patient was obtained before the participation. We used the FIM test to measure functional self-sufficiency, visual anal pain scale of 0-10, goniometric examination and muscle tests. Through the analysis of the medical documentation, we have gained information on the overall health status of the probate in prechory, co-morbidities, but also in the development of the current illness. Patient underwent a 90-min continuous treatment of breathing 100% oxygen once a day for 28 days in a multiplace HBOT chamber (HAUX-Starmed 2200/2.2S) pressured to 2.0 ATA. At the same time, physiotherapy was provided with the following interventions: antispastic positioning, vascular gymnastics, breathing gymnastics - localized breathing) and left lower limb (LLL), exercise with aids, stabilization training, stabilization training at the reins, right-handed release exercises, fine hand motor skills training, self-care training, Kabat's methodology, Bobath's methodology, walking re-education.

## CASE REPORT

J. M., a 56-year-old man, was treated for 1.5 years as a result of ischemic CVA with complicated post-thrombolytic and thrombectomy with secondary basal ganglion. Probant is home-grown, treated by the HBOT method and at the same time intensively rehabilitated. After CVA, he was diagnosed with hypertension III. degree, atrial fibrillation, obliterating atherosclerosis, depressive syndrome and secondary epilepsy.

Health perception: Probant did not treat any serious illness before the accident, felt good, worked hard. He lived an active work and family life. He did not go to regular practice visits to a practitioner for adults; he did not feel the need. He did not take any medication. He smoked 20 to 30 cigarettes a day. After CVA, he was diagnosed with hypertension III. degree. They have been diagnosed with lower limb atherosclerosis, epilepsy and depressive syndrome, overcoming atrial fibrillation. After being released from institutional care and health compensation, he underwent rehabilitation treatment. During our study he underwent HBOT. Probant tried to work actively in both treatment and rehabilitation. She's a wife and an assistant.

### *Entrance examination*

Consciousness: the patient is oriented in time, space and person; Speech: is incomprehensible (secondary expressive aphasia), probant has the problem of finding the right expression for a particular thing, cannot make sentences. Best controls digits. He agrees to express it by drawing, does not want to communicate verbally. She cooperates actively with the exam.

Motor functions: Probant can build with the help of a second person. It goes with the help of a second person and a French barley about 10 meters. Walking is hemiparetic with circumduction, right knee and ankle joint is still partially unstable. Sed is stable. The active and passive momentum of the limbs on the left side are preserved. Right upper limb (RUL) is spastic, objects do not hold in it.

Sensory functions: The right side does not feel well, it does not know the touch on the affected part of the body, it does not feel its limits. Self-care's ability is expressed in a point scale and summarized in Chart 1.

### Chart 1 Self-sufficiency before HBOT

Total motion	3	Ability to dress	3
Move on the bed	2	Ability to go to the toilet	3
Ability to eat	3	Ability to buy	4
Ability to wash	3	Ability to cook	4
Ability to bathe	3	Ability to maintain a household	4

Legend: 0 - complete independence; 1 - light dependence (requires a compensatory aid); 2 - medium dependency (needs aid, supervision or minimal assistance); 3 - heavy addiction (needs help); 4 - complete dependence (requires complete care)

Subjective examination: The probant indicates right-sided weakness and worsening of walking. Indicates pain in the right shoulder joint at the extreme positions at Grade 8 pain scale 0-10. Sitting, standing and walking examination: sed is stable. He can slowly cope with one person and one French bar. Walking is hemiparetic circumduction knee and ankle joint are unstable, peak falls off.

### ***Comparison of input (before HBOT) and outbound (HBOT) probant***

Probant examinations measured the range of passive movements according to the SFTR method in individual joints of the body, measurement of muscle strength and measurement of functional self-sufficiency. The active and passive momentum of LUL and LLL is preserved, so only paretic right legs were measured. The values obtained are summarized in Charts 3 - 4.

### Chart 3 Comparison of input and output phonometric examinations RUL

Investigated area		Plane	Physiological values	Entrance examination	Output examination
RUL	Shoulder joint	S:	45°-0°-180°	20°-0°-80°	20°-0°-110°
		F:	180°-0°-30°	80°-0°-10°	90°-0°-10°
	Elbow joint	S:	0°-0°-160°	0°-0°-100°	0°-0°-150°
	Carpal joint	S:	60°-0°-90°	20°-0°-30°	25°-0°-50°
RLL	Hip joint	S:	5°-0°-170°	0°-0°-90°	5°-0°-100°
		F:	90°-0°-20°	10°-0°-10°	10°-0°-20°
	Knee joint	S:	0°-0°-160°	0°-0°-90°	0°-0°-110°
	Ankle joint	S:	10°-0°-90°	/°-10°-30°	0°-0°-60°

Legend: RUL - right upper limb; RLL - right lower limb; S - sagittal plane; F - frontal plane;

#### Chart 4 Muscle Test

Investigated area		Entrance examination	Output examination
RLL	Hip joint	Flexors	2
		Extenzors	1
		Abduktors	2
		Adduktors	2+
	Knee joint	Flexors	2
		Extenzors	2
	Ankle joint	Flexors (Dorsal flexion)	1+
		Extenzors (Plantar flexion)	1+
RUL	Shoulder joint	Flexors	1
		Extenzors	1
		Abduktors	1
		Adduktors	1
	Elbow joint	Flexors	0
		Extenzors	0
		Supinators	0
		Pronators	0
	Carpal joint	Flexors (Dorsal flexion)	0
		Extenzors (Plantar flexion)	0

Legend: RLL - right lower limb; RUL - right upper limb; 5 degree rating scale (5 - max, 0 - least, + - half);

#### DISCUSSION

The case report was a case study of a middle-to-severe right-to-severe right-handed hematopoietic prolapsed after a complicated course of ischemic CVA. In the case study, we focused on promoting mobility, reducing spasticity, and supporting self-care of probant with CVA at a time-out of 1.5 years from an event that no progress has been observed at any given time. The basic aspect was the therapy of a physiotherapist under HBOT conditions. From the time point of view, we have been looking at the possibilities of improving the condition of an individual through the effects of hyperbaric oxygen and physiotherapy intervention. We focused mainly on the area of the movement of the paretic limbs and the improvement of the self-care.

Based on the presented case study, we can state that HBOT and the field of physiotherapy should be interconnected because they interact synergistically. Another effect we have been subjected to subjective examination is the reduction of pain. The probant did not receive pain-relieving drugs for the duration of HBOT or did not receive physical therapy that could reduce the pain, so it can be assumed that this symptom was reduced by HBOT. In conclusion, the positive effect of hyperbaric oxygen application was observed, which resulted in the observation of the spasticity retreat, which indirectly affected the pain of the probator after the CVA itself.

In addition, according to the self-care classification, the self-care was improved in order to gradually improve its momentum. In the FIM, the probability improvement was 30 points, which also indicates the positive effect of therapy and physiotherapy intervention. However, the probant family should, in general, make a significant contribution to the process of regaining self-sufficiency of the probant, if possible, to know how to proceed

when returning to the home environment and to ensure that rehabilitation is not neglected. In the case of our probate, relatives for him represented psychic support.

## CONCLUSION

To date, the therapeutic methods for ischemic and hemorrhagic stroke are still limited. The lack of oxygen supply is critical for brain injury following stroke (Hu et al. 2016). Presented case report indicated, that HBOT has an important influence for the treatment of stroke. Its disadvantage lies in the vast material and technical demands. As a result, it is limited to a small number of workplaces, and there are not existing uniform valid and obligatory guidelines. Further comprehensive clinical trials are needed in the formation of standardized therapeutical procedures with the defined sequences of treatment interventions and the estimated range of laboratory determinated parameters.

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## STAPHYLOCOCCUS AUREUS AND ITS CARRIAGE OF THE HEALTHY POPULATION OF CHILDREN

### STAPHYLOCOCCUS AUREUS A JEHO NOSIČSTO V ZDRAVEJ POPULÁCII DETÍ

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#### Abstract

**Introduction:** *Staphylococcus aureus* in individuals in the healthy population of children is an important aspect of the public health aspect due to the constant variability of its antigenic and serological parameters due to the selective pressure caused mainly by the use of antibiotics.

The aim of this study was to investigate the frequency and persistence of *Staphylococcus aureus* colonization in a healthy population, sample processing, statistically assessing the results and comparing them with other expert studies.

**Methods and Material:** The aim of this bachelor degree work was to determine the frequencies and of the persistence of colonization by *Staphylococcus aureus* in healthy populations, sample processing, statistical evaluation of the results to compare them with other professional studies. Obtained materials in combination with literature were resources of work.

The samples were processed and cultured using standard microbiological procedures. We used cultivation methods followed by microscopic methods for processing all obtained samples. We used biochemical identification specifying the presence of *Staphylococcus aureus*. The swab samples were taken from children patients who were born between 2002-2013 in the period from January to June 2016.

**Results:** Total number of collected samples was 469, of which 122 samples showed the presence of *Staphylococcus aureus*, which amounted to 26% of positive results. We processed incidence of *Staphylococcus aureus* in terms of presence in each year of birth of the patient, where largest representation was in the birth of 2003 (n = 17). Similarly, according to the place of colonization, where the most frequent site of colonization tonsil - 78 samples (64%) and the second most frequent site of colonization was of nasal mucosa - 34 samples (28%). Also, we determined the most common diagnosis, where in the highest percent representation (25%) had a diagnosis of acute inflammation of the larynx and trachea (J 04.2). We also focused on prescribed antibiotics where dominant antibiotic was Klacid 24%. 100% of sensitivity was showed for 12 discs and sensitivity between 70% - 100% was showed for 6 discs. The highest resistance was manifested by the cefoxitin disk test (91.6%). We found out that the time rate of occurrence in each year of birth for positive children have a slightly erratic tendencies but only with small variations ( $p = 0.28$ ).

**Conclusion:** Our results confirm the decrease in beta-lactam antibiotics and their derivatives. At present, macrolide derivatives are the most effective antibiotics in the case of *Staphylococcus aureus*. However, due to the limited number of antibiotics, the increasing number of resistant strains is a serious problem.

**Keywords:** *Staphylococcus aureus*. Resistance. Incidence. Children.

### **Abstrakt**

**Úvod:** Nosičstvo *Staphylococcus aureus* u jedincov v zdravej populácie detí je z aspektu verejného zdravotníctva dôležitý parameter vzhľadom na neustálu variabilitu jeho antigénnych a sérologických parametrov v dôsledku selekčného tlaku, spôsobeného predovšetkým používaním antibiotík.

Cieľom tejto štúdie bolo zistiť frekvenciu a pretrvávanie kolonizácie *Staphylococcus aureus* v zdravej populácii, spracovanie vzoriek, štatisticky vyhodnotiť výsledky a porovnať ich s inými odbornými štúdiami.

**Metodika a materiál:** Vzorky boli spracované a kultivované podľa štandardných mikrobiologických postupov. Pre spracovanie všetkých získaných vzoriek sme použili kultivačnú metódu, následne mikroskopickú metódu. Pre bližšie určenie prítomnosti *Staphylococcus aureus* sme využili biochemickú identifikáciu. Vzorky sterov boli odobrané od detských pacientov narodených v rokoch 2002 - 2013 v sledovanom období január až jún 2016.

**Výsledky:** Celkovo bolo odobraných 469 vzoriek, z ktorých 122 vykazovalo prítomnosť *Staphylococcus aureus*, čo činilo 26 % pozitívnych výsledkov. Spracovali sme výskyt *Staphylococcus aureus* z hľadiska prítomnosti v jednotlivých rokoch narodenia pacientov, kde najväčšie zastúpenie bolo v roku narodenia 2003 (n = 17). Rovnako podľa miesta kolonizácie, kde najfrekventovanejším miestom kolonizácie boli tonzily 78 vzoriek (64 %) a druhým najčastejším miestom kolonizácie bola nosová sliznica 34 vzoriek (28 %). Taktiež sme určili najčastejšie diagnózy, kde najvyššie percento zastúpenia (25 %) mala diagnóza akútnej zápal hrtana a priedušnice (J 04.2). Zamerali sme sa aj na predpísané antibiotiká, kde prevládalo antibiotikum Klacid 24 % a citlivosť na antibiotiká. U 12 diskov sa preukázala 100%-ná citlivosť, u 6 diskov sa pohybovala citlivosť v rozmedzí 70 – 100 %. Najvyššia rezistencia sa prejavila u disku testovaného na cefoxitin 91,6 %. Zistili sme, že časová dynamika výskytu v jednotlivých ročníkoch narodenia u pozitívnych detí má mierne kolísavú tendenciu, ale len s malými odchýlkami ( $p = 0,28$ ).

**Záver:** Naše výsledky potvrdzujú pokles účinnosti beta-laktámových antibiotík a ich derivátov. V súčasnosti sú v prípade sledovaných kmeňov *Staphylococcus aureus* najúčinnejšími antibiotikami makrolidové deriváty. Vzhľadom na obmedzený počet antibiotík však vzrastajúci počet rezistentných kmeňov predstavuje závažný problém.

**Kľúčové slová:** *Staphylococcus aureus*. Rezistencia. Výskyt v populácii detí.

## 1. OBJECTIVE

Most members of the genus *Staphylococcus* are an integral part of the natural microflora in both humans and animals, not causing any more serious diseases. The most frequent place of occurrence of *Staphylococcus aureus* are tonsils along with the nasal mucosa and the skin. Bacteria is known for its rich production of virulence factors, biologically active substances, promotional and transport factors and toxins (Namvar et al. 2014). In the case of a weakening of the immune system of the macroorganism, *Staphylococcus aureus* can cause an endogenous infection. After penetration into the bloodstream, it subsequently causes septic conditions. The risk groups are mainly individuals after instrumental interventions, patients with diabetes mellitus, and lying patients in hospital facilities with higher risk of nosocomial infections. Treatment is often complicated due to the occurrence of resistant or multi-resistant strains (Zecconi et al. 2013).

At present, *Staphylococcus aureus* is a global problem because of its higher adaptability to the environment in which it is located. The endeavor to survive forces the pathogen to create new, more effective protective means. This is also associated with increasing antibiotic resistance, which was also attributed to excessive use of antibiotics. MRSA (methicillin-resistant *Staphylococcus aureus*) and VRSA (vancomycin-resistant *Staphylococcus aureus*) are involved in prolonging patient stays and increasing costs of treatment in hospital facilities. The most commonly used antibiotic for the treatment of infections is oxacillin (methicillin). This agent belongs to the group of penicillins which are resistant to penicillinases. They are used in treatment of both local and systemic diseases caused by staphylococcal agents and mixed streptococcal infections (soft tissue infections). In the treatment of diseases such as endocarditis and general infections, oxacillin is used in combination with gentamicin. The reason is the synergistic effect of both antibiotics. In treatment of the toxic shock syndrome, oxacillin is co-administered with clindamycin, which belongs to the lincosamide group. Clindamycin inhibits proteosynthesis and thus suppresses the formation of bacterial toxins. Amoxicillin / clavulanate is used to treat lighter infections; it is a penicillin antibiotic enriched with a betalactamase inhibitor (Jindrák et al. 2014; Hanulík et al. 2011).

## 2. DESIGN AND PARTICIPANTS

In our retrospective study we determined the occurrence of *Staphylococcus aureus* in samples of swabs from the nasal mucosa, tonsils, rectum, auditory canal and vaginal smear.

We evaluated the data for 469 samples (273 males, 196 females) from pediatric patients aged 3 to 14 years from the catchment area of the Ambulance for Children and Adolescents in the Revúca region, collected between January 2016 to June 2016. All personal data were de-identified.

## 3. METHODS

Stem samples from pediatric patients were harvested using commercially produced disposable detoxified sterile swabs. When transported, samples were stored in a specially

modified thermobox in a vertical position. Upon delivery to the laboratory, the samples were taken, checked, marked and processed for microbiological examination.

The samples of swabs were inoculated into blood agar, and incubated for 24 hours at 37°C. Suspicious colonies of *Staphylococcus aureus* grown in cream, cream to orange colonies with beta-hemolysis zone were subjected to the following confirmatory assays: gram-stained preparation, catalase assay, plasma plasmoglobase assay, and Staphyttest24. Strains confirmed as *Staphylococcus aureus* positive, were tested for antimicrobial susceptibility sensitivity by disc diffusion method.

Statistical analysis was performed with the program InStat 3.1 (GraphPad Software, Inc., USA). Obtained data were analyzed using the chi-square test. A *p*-value less than 0.05 was considered to be statistically significant and we rejected the assumption of random effects on the abundance of the observed microorganism.

Our investigation was realized as a preliminary study of the project focused on the using of the hyperbaric oxygen therapy as a complementary therapy of selected diseases such a cerebrovascular attacks, diabetic foot, sudden hearing loss, etc. (Zigo et al. 2017; Gebrlínová et al. 2016; Baňárová et al. 2014; Gerlichová et al. 2014; Krajčovičová et al. 2014). For this treatment method, it is necessary to monitor not only the internal microbiological environment of the hyperbaric chamber but also to have an overview of the prevalence of individual bacterial strains in the population.

#### 4. RESULTS AND DISCUSSION

Based on the results, we can state that in the population of healthy children in the studied region, *Staphylococcus aureus* occurred at a constant frequency without episodes of increased enlargement at an average of 26%, and the studied population did not show statistically significant deviations of the observed abnormalities from the expected values (*p* = 0.29).

**Table 1** Testing of differences in the number of positive findings

Year of birth	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	Total
<b>Pos</b>	5	6	5	9	16	11	10	11	11	12	17	9	122
<b>Neg</b>	32	29	36	23	34	29	29	23	25	30	31	26	347
<b>Total</b>	37	35	41	32	50	40	39	34	36	42	48	35	469

Legend: Pos - Positive finding of *S. aureus*; Neg - negative evidence of pathogen; Chi-square test:  $\chi^2=13,002$ , d.f.=11, *p*=0,29.

The nasal mucosa, the tonsil surface, rectal, cervix and auditory canals were used for the collection areas. The largest proportion of swabs collected in our study were tonsils (337 samples, 71.9%), followed by nasal mucosa (101 samples, 21.5%), rectum (24 samples, 5.1%), auditory tube (6 samples; 1.3%) and from the vaginal smear (1 sample, 0.2%).

Similarly, from swabs taken in children with identified *Staphylococcus aureus*, the highest representation had the swabs of tonsil (78 samples; 64%), followed by nasal mucosa (34 samples; 28%), rectum (6 samples; 5%), auditory tube (4 samples; 3%) and vaginal smear (0 samples; 0%).

On the basis of obtained data, we can conclude, that the tonsils carriage of *Staphylococcus aureus* was prevailed with the average number of swabs 28.08, and 6.5 of swabs taken in children with identified *Staphylococcus aureus* respectively.

Interestingly, there is an overview of the resistance of *Staphylococcus aureus* against the antibiotics used. We can state that the highest resistance of strains of the observed microorganism was found in Cefoxitin antibiotics (almost 92% of cases), Ampicillin sulbactam (33%), Spiramycin (26%) and erythromycin (10%). Resistance to other preparations was less than 6% (Table 2).

**Table 2** Resistance of *Staphylococcus aureus* to selected antibiotics

antibiotic	Oxacillin	Clindamycin	Cefalotin	Cefuroxime	Doxycycline	Kotrimoxazol	Clarithromycin	Amoxiklav	Gentamicin	Erythromycin	Augmentin	Spiramycin	Trimetoprim-sulfonamid	Cefaklor	Oftioxacin	Tetracycline	Cefoxitin	Ampicillin-sulbactam	Ciprofloxacin
<b>Sensitivity</b>	70	68	31	14	29	29	2	12	29	60	27	20	33	27	12	43	1	22	12
<b>Resistance</b>	2	4	2	0	0	0	0	0	0	7	0	7	0	0	0	0	11	11	0
<b>Total</b>	72	72	33	14	29	29	2	12	29	67	27	27	33	29	12	43	12	33	12

Esposito et al. (2014) investigated in their study, the oropharyngeal and nasal colonization of *Staphylococcus aureus* in healthy children. They focused on the group of children aged from 6 to 17. Samples were collected by 497 children and adolescents. They identified 264 samples (53.1%) as *Staphylococcus aureus* positive. In 129 isolates (25.9%) they confirmed the presence of *Staphylococcus aureus*, which colonized the oropharyngeal region, 195 specimens (39.2%) were nasal colonization, of which 60 samples (12.1%) showed combined oropharyngeal and nasal colonization. In the study, the presence of the oropharyngeal support increases proportionally with age ( $p < 0.001$ ), while the nasal load decreases.

Antibiotic activity against the pathogen plays a major role in its removal from the human body, and so many studies deal with this issue. Hamdan-Pardita et al. (2010) performed *Staphylococcus aureus* susceptibility tests on identified antibiotics, resulting in a percentage assessment of the detected resistance to: penicillin 91.1%, erythromycin 23.1%, tetracycline 15.5%, cephalothin 7.1% and clindamycin 6.2%. Up to 2% resistance was demonstrated for ciprofloxacin, fosfomycin, trimethoprim-sulfamethoxazole and gentamicin. No resistance to vancomycin was found. Compared to our erythromycin results, we found a lower percentage of resistance (10.4%), whereas the sensitivity to tetracycline was 100% in contrast to the value in the study. In the case of cephalothin (6.1%) and clindamycin (5.6%), there was no significant difference between our work and the comparative study.

Another study by Erbuke et al. (2016) also suggests that all *Staphylococcus aureus* isolates were sensitive to methicillin but found resistance to trimetroprim sulfamethoxazole (15%) and tetracycline (34.3%).

## 5. CONCLUSION

We focused on the occurrence of *Staphylococcus aureus* and its carrier in a healthy population of children aged 3 to 14 years in the selected catchment area. After processing and evaluating the obtained samples, we confirmed the presence of *Staphylococcus aureus* in 26% of cases with the most frequent occurrences of tonsils. Positivity was slightly fluctuating compared to each year of birth, but only slightly different. From this, we can conclude that the presence of *Staphylococcus aureus* is still under control.

At present, with regard to infections caused by *Staphylococcus aureus*, specialists focus mainly on antibiotic resistance, biofilm formation and intracellular survival. Our study confirmed increased incidence of resistance to beta-lactam antibiotics and their derivatives. In the future, it will be necessary to strictly keep all hygienic-prevention measures aimed at limiting the increase of the resistance to individual antibiotics.

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## ANALYSIS OF SOCIO-ECONOMIC ASPECTS OF THE QUALITY OF LIFE OF SENIORS IN SLOVAKIA

### ANALÝZA SOCIÁLNO-EKONOMICKÝCH ASPEKTOV KVALITY ŽIVOTA SENIOROV NA SLOVENSKU

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#### **Abstract:**

**Aim:** The article deals with aging of populations, respectively. the quality of life of seniors, with an emphasis on its socio-economic level, retirement and the pension security system. Describes social services and health care for seniors in Slovakia, including institutional care. It characterizes the old age, concepts such as population aging, quality of life, ageism, and other.

**Scope:** To analyze and compare the resulting socio-economic dimensions of the quality of life of seniors living in the home environment and the quality of life of seniors who are clients of social services facilities. Another goal is to measure the age-old experience of seniors' experiences, and compare this depending on whether seniors are or are not a social service provider.

**Methods:** A questionnaire method was used, the research had the character of a quantitative analysis. The research sample was Slovak seniors aged 62 years and older. The number of respondents was 224, of which 95 (42.4%) in institutional (residential) care and 129 (57.6%) respondents living in their own home environment.

**Conclusion:** Personal experience with age discrimination reported almost half of the respondents (46.9% of all respondents). More experience with these negative phenomena have seniors who are clients of the institutional facilities (56.8%).

**Keywords:** Senior citizens. Population ageing. Quality of life. Social-economic aspects of the quality of life. Ageism. Social and health care for senior citizens.

#### **Abstrakt**

**Zameranie:** Článok sa zaoberá starnutím populácie, resp. kvalitou života seniorov, s dôrazom na jej sociálno-ekonomickú rovinu, odchodom do dôchodku a systémom dôchodkového zabezpečenia. Opisuje sociálne služby a zdravotnú starostlivosť o seniorov na Slovensku, vrátane inštitucionálnej starostlivosti. Charakterizuje obdobie staroby, pojmy ako starnutie populácie, kvalita života, pojem ageizmus a ďalšie.

**Ciel:** Analyzovať a porovnať výsledné hodnoty sociálno-ekonomickej dimenzie kvality života seniorov, žijúcich v prostredí vlastného domova a kvality života seniorov, ktorí sú klientmi zariadení sociálnych služieb. Ďalším cieľom je zistiť mieru skúseností seniorov s diskrimináciou na základe veku a túto taktiež porovnať v závislosti od toho, či senior je alebo nie je klientom zariadenia sociálnych služieb.

**Metodika:** Použitá dotazníková metóda, výskum má charakter kvantitatívnej analýzy. Výskumnú vzorku tvoria slovenskí seniori vo veku 62 a viac rokov. Počet respondentov je 224, z toho 95 (42,4 %) v inštitucionálnej starostlivosti a 129 (57,6 %) respondentov sú seniori žijúci v prostredí vlastného domova.

**Záver:** Osobnú skúsenosť s vekovou diskrimináciou uviedla takmer polovica (46,9 %) všetkých opýtaných respondentov. Viac skúseností s týmto negatívnym javom majú seniori, ktorí sú klientmi inštitucionálnych zariadení (56,8 %).

**Kľúčové slová:** Seniori. Starnutie populácie. Ageizmus. Kvalita života. Sociálno-ekonomicke aspekty kvality života. Sociálna a zdravotná starostlivosť o seniorov.

## CHARACTERISTICS OF OLD AGE

Old age is the result of a combination of past experiences and experience, projected into the present in the form of memories, present moments, but also the future. It is possible, however, to look at it from multiple angles. On the one hand, it is the final phase in which life ends. On the other hand, however, a whole range of new possibilities and positives opens up, which just need to be grasped. From a gerontological point of view, the age is characterized by the decline of adaptation mechanisms, specific changes, the course of degenerative changes, the accumulation of pathological processes, changes in the area of mental health and, last but not least, socio-economic changes. Hamžík (2003, p. 13) defines old age as the "natural and lawful stage of the inner and physical life of man", which can be accessed in several ways. According to the author, age is not only a "life ending point", it is, the final phase of life, but also a period that offers many benefits and, in particular, a whole range of new possibilities and opportunities. It also depends on how we get older. Similarly, as the previous development stages, old age also has its meaning. According to the German psychologist Eriksson (In Spar, Rue 2002), seeks to achieve integrity and understanding the meaning of his or her own life. However, this is not a simple process, since achieving integrity requires multiple conditions. These include, for example, truthfulness and sincerity towards oneself, continuity, it is understanding of one's own life in relation not only to the present, but also to the past and the future, to the generalization of life attitudes and others. The ultimate goal of this process is reconciliation, respectively accepting life as it is, as it was and as it will be and dealing with dying and death.

The factors that influence the ageing process can be classified into three main categories, namely the medical, psychological and social-economic factors. The category of medical factors includes inheritance, respectively certain genetic assumptions, the variability of biological processes, the course and treatment of diseases, eating habits and the overall health of a person. Psychological factors mean, above all, subjective perception of the quality of life, but also include cognitive functions, levels of sensory perception, creativity, or overall personality characteristics. The last category is social-economic factors, including material and financial security, access to resources, transport, participation in social events, but also the quality of social relations, working conditions in previous jobs, interest in surrounding events, culture, education, leisure activities etc. (Balogová, 2009). Despite the same factors

influencing the aging process, respectively old age as such, seniors do not represent homogeneous group of citizens.

Seniors differ from each other by their personality and character characteristics, but also their lifestyle, respected values, opinions, needs and demands. Differences between seniors are also visible in their different views on old age and the acceptance of problems that accompany it (Haškovcová, 2010). Besides the genetic equipment and the uniqueness of the personality features, there are also factors such as primary socialization, upbringing, education, social environment, quality of social relations, career, respectively the course of employment, interests and hobbies, social status, but also acquired life experience, habits, goals, and so on.

## AGEING OF THE POPULATION

Ageing of the population can generally be defined as a rapid increase in the relative number of older population groups in society. "It's a global demographic change that only means a temporary shift. It does not mean that humanity could be constantly and infinitely older, without slowing down, without stabilizing this development. However, the model of society that is hostile to older people is becoming increasingly global "(Hetteš, 2011, p. 11). The phenomenon of aging populations is currently affecting not only Slovakia and the European Union, but almost all the developed countries of the world. We observe it through three indicators, namely the index of aging, the average age of the population and the average life span, also the average number of years of survival for persons of both sexes and ages, provided that there is no change in mortality rates (Statistical Office of the SR, 2014). As a result of population aging, there are usually many major changes in society. It is a change in the content of political programs - with a significant change in the age structure of the population, the political opinion of older voters becomes the key, changes in the social system, but also, for example, a change of perception of sense and the need for lifelong learning, With the rapid increase in the number of elderly people in retirement age, higher costs of health and social care services are automatically linked. From an economic point of view, there is a need for restructuring and a constant increase in retirement age as well as retirement provision. In the context of this issue economic, social, medical, as well as psychological or political issues are at the forefront. As Hrozenská and team (2008, p.8) "ageing individuals grows the whole society". Compared to other European countries, Slovakia is still less "old". The National Ageing Agenda for 2014-2020 states that while 15% of the workforce will be missing in the EU as a result of the ageing of the population in 2050, it is likely to be up to 21% in Slovakia. Slovakia will not only be older, but as it is less numerous, it is assumed that it will also be ethnically poorer. While maintaining the current birth rate, it is even a forecast that we will be one of the oldest European populations in the second half of the 21st century (Bleha, Šprocha, Vaňo 2013). The aging of the population also has its positives. According to Hetteš (2011, p. 20) "this is triumph in terms of health, social and economic progress. The existing system of social assistance brings challenges and affects practically all areas of society. In the context of a longer life, the significance of conventional and legally defined age breaks in life transitions, such as retirement, changes as the share of surviving peoples continues to rise after that age".

## **SOCIAL-ECONOMIC ASPECTS OF THE QUALITY OF LIFE OF SENIORS**

Quality of life for seniors depends on many variable aspects, including physical health, but also, for example, unemployment rate, psychological functioning in cognition, adaptation and management of predominant emotional survival, psychological support as well as spirituality. In the elderly, the importance of subjective health assessment is increasing, with the quality of life currently appearing to be a more appropriate indicator of health than morbidity and mortality (Butler 2010). In addition to health and psychological and emotional survival, the quality of seniors' life also reflects other factors. These include, for example, adaptability, participation in social life, leisure time, or the social environment, respectively the quality of social relations, and so on. However, according to Venglářová (2007), this is in particular an optimal lifestyle that involves maintaining autonomy, self-sufficiency, self-esteem, social status, contacts and interactions, but also, for example, the sense of usefulness and other attributes important for the happy and harmonious survival of old age. The social-economic aspects of the quality of life of seniors include the social environment, financial and material security of the household, transport, security, health care, social services, access to information and other resources available to society. The social-economic level of quality of life is monitored using indicators such as gross domestic product, average life expectancy and literacy of the population (Hrozenská and team, 2008). Social age is characterized by a change in social tasks, lifestyle, and economic security. It also includes negative aspects such as social exclusion, prejudice and age discrimination, generational intolerance, segregation, but also increased morbidity, atypical course of disease, a decrease in ability to signal one's own needs, a loss of social orientation due to rapid advances in technology and more. It is a period defined by the combination of several social changes or fulfilling a certain criterion - the most frequent retirement, respectively reaching the age at which entitlement to retirement is due (Mühlpachr, 2004). In addition, it may include changes in residence, limitation or loss of social contacts, weakening of interactions, or even loneliness. According to Krajcik (2006), lonely people can also feel old people living in the family or in the institution, as they can not get close contact with the environment. Loneliness is closely related to the loss of life partner. This, especially when it comes to the advanced age, tragically affects almost all the components of human life. Poledníková and team (2006, p. 12) report that in the elderly, a mature couple develops a very strong marriage bond, which makes it easier for ageing and encourages them. "After the death of a partner, they experience the second feeling of loss, emptiness, abandonment. Many get used to living alone, but become dependent on other, younger members of the family. " The death of a life partner deepens the feeling of emptiness, abandonment, as well as threats or personal insignificance. There may be a breakdown in the structures of learned everyday habits and daily routines, as well as the deterioration of the economic situation, and so on. In extreme cases, the death of a life partner can lead to a total loss of life. Some seniors try to compensate for the feelings of loneliness by finding and establishing further social contacts with peers, which in such a situation represents one of the possible ways for them.

## AGEISM

Seniors form a population group that is also greatly endangered by age discrimination - so called ageism. Vidovičová (2008, pp. 111-113) defines ageism as an "ideology based on shared beliefs about the qualitative inequality of individual phases of human life cycle, developed through the process of systematic, symbolic and real stereotyping and discrimination of persons and groups based on their chronological age or on the basis of their belonging to a particular generation ". Ageism is manifested in a wide range of phenomena both at individual and institutional level. Attitudes to understanding it include two levels. The first is the discrimination, prejudices and systematic application of stereotypes, usually based on a misunderstanding of the qualitative inequalities of the individual phases of human life and the highly subjective perception of the senior population. The second level is a feeling of discrimination against seniors themselves, which is based on failure to respect their own ego, negative attitudes towards old age as such (Gutman, Spencer 2010). As it is well known in practice, the human rights of older people are not sufficiently secured through the current legal system. Individual state policies failed to adequately implement and incorporate the rights of senior citizens into laws, budgets and program statements, as evidenced by the non-decreasing rate of ageism in society.

### The status of seniors in the labor market

The status of seniors in the labor market is one of the key factors influencing the future development of Slovak society, with pre-retirement citizens being among the most endangered groups in the labor market. It is important to understand that in the aspect of the aging of the population, this group will become more and more numerous in the labour force. For this reason, labor market measures caused by ageing of the labour forces should take into account, in the first place, development in this group of people. The general rate of economic activity as well as the rate of employment affects, to a certain extent, the age structure of the population as well as the possibility to acquire certain education. Based on data from the Statistical Office of the Slovak Republic (SÚ SR) from the Labor Force Survey, economically active persons aged 50-64 in Slovakia accounted for almost 25% in 2012, compared with only 14% in 2000. The website of the Statistical Office of the Slovak Republic also states that the total average number of economically active citizens in pre-retirement and retirement age, consisting of the number of employed and unemployed persons aged 50-64 years, has increased since 2000 from the original approximately 365 thousand to almost 675 thousand in the year 2012, with an increase in the number of economically active people aged 55-59. In relation to the labor market, the growing number of older people in society is perceived to be rather negative, respectively as a nuisance for young, employed people. It is expected that as well as people live longer, they will also work longer. However, it is necessary to realize that the current seniors are doing much better compared to the past on many levels, especially health. They also have valuable experience and skills that can be handed over to younger people. Their professional and social skills that they have acquired during their careers represent a special potential. As Hetteš states (2011, p. 48), "older workers may have valuable knowledge, experience, and may be able to train, consult or lead less experienced colleagues."

The author adds that aging should not allow to lose such valuable resources such as older workers are. If older people are willing to work, but they do not make it possible for labor market conditions, society should deal with it. Promoting participation of older people's labor force is a key issue for active aging in an aging society in the significance of the Madrid International Action Plan on Ageing.

## **RETIREMENT**

A significant change occurs with the retirement of the senior, as a result of which not only its economic, a financial situation that is generally worsening, but also the whole previous way of life. Despite the fact that seniors typically have lower costs of housing, meals, clothing or social life, these changes cause them great problems. Money allows them more independence and self-sufficiency, offering them more opportunities to lead an optimal way of life. Venglárová (2007) understands the senior's optimal way of life, namely maintaining social relations and contacts, preserving self-esteem, social status, autonomy and, if possible, self-sufficiency to the highest possible age. Retirement, however, usually occurs when the senior does not have enough money to maintain social, leisure and other activities from the previous period. This also leads to a gradual weakening of his social relations, the loss of contacts, and eventually a change in social status. According to Hegyi and Krajčík (2010), the change in retirement life leads to so-called "basal activities, it means the preference of only one, maximum two activities. The authors report that about 17% of all seniors of both sexes would like to continue their professional activity, albeit on a reduced scale. This effort is twice as common in people with lower incomes, so it is more likely to be financial difficulties than interest in work. Seniors form a consumer population group with specific requirements and needs, with the bulk of their economic strength coming from their retirement provision. In countries with higher incomes, the specifics of seniors, as consumers, are taken into account, mostly by business and service providers. This creates a considerable purchasing power. However, the less wealthy states are more reliant on family support, emphasizing financial planning and active preparation for retirement.

Pensions are currently a huge and growing share of public spending, accounting for more than 10% of GDP on average. For this reason, questions about pension provision concern all citizens alike. The basic and at the same time the most important pension benefit is the old-age pension. The old-age pension is a retirement benefit under the conditions established by Act no. 461/2003 lawbook on social insurance provided by old-age insurance, paid by the Social Insurance Agency (Juššiková, Vranková, 2012). The pensioner is entitled to a retirement pension if he has been insured for at least 15 years and has reached the retirement age. The retirement age is currently set at 62 years.

## **SOCIAL SERVICES AND HEALTH CARE FOR SENIORS**

Social services are complex of professional, service and other activities aimed at solving, alleviating, as well as preventing the occurrence of an unfavorable social situation and social exclusion, as well as ensuring the necessary conditions for satisfying the basic needs of people in material or social need to support the inclusion etc. Social services form

one of the forms of social assistance, with a comprehensive system of tools and measures aimed at integrating, helping, supporting and satisfying the social needs of disadvantaged groups of the population. Health care for seniors in Slovakia is characterized by several key issues. First of all, there is a typical low range and quality of services and professional geriatric care. Furthermore, it is absence, respectively the lack of facilities for long-term care, the uncertainty of hospital care for the future, and last but not least, the increasing share of patients' contributions to health care (Hegyi, Krajčík, 2010). In the case of reliance on the help of another person due to the worsen state of health of the elderly and if other possibilities of assistance within the family or households, there is time for institutional care. It represents full comprehensive care of clients in designated health care facilities and social services facilities, the task of which is to provide professional assistance, treatment, shelters, etc. However, the problem of institutional care for seniors is not at all easy, but it opens up a whole range of issues that often require urgent solutions. This issue involves many different aspects, many of which are of a negative nature. According to Haškovcová (2010), the negative phenomenon is the very institutionalization itself. As a result, the seniors are subjected to anonymity, uniformity, and inertia of institutional life, thereby gradually losing their own identity. Another risk is the emergence of the so-called geriatric maladaptation syndrome. This is a symptom of adaptive failure and may develop in the elderly because of the persisting stress caused by staying in an unfamiliar environment. The risk of developing maladaptation syndrome increases in seniors due to factors such as high age - with increasing age the ability to adapt to the new environment gradually declines, so the most endangered groups are very old seniors.

Slovakia is the worst among the countries of OECD and other compared countries. As for the life expectancy, Slovakia is on the bottom position among the countries of the European Union (Bartosovic et al. 2017). Whitehead (2017) in his study indicated that the Slovak Republic is experiencing an aging population and may not be able to accommodate elders in the future due to an increased demand for services. There is opportunity for growth within the informal caregiving sector by increasing support and education.

### **Social work with seniors and competencies of a social worker in the given area**

Social work with the elderly is based on wider social relationship and ethical principles. It is made up of a set of specific professional activities and services for elderly people. Its role is to provide adequate professional assistance and care, based on mutual trust, respect, empathy and respect for the opinions and needs of older people. The basis is respect for a person who does not change in principle either the disease or the age or other factors. The skills of a social worker in senior care depend on the specific area of services in which the social worker works. In the case of institutional care, as stated by Bartošovič (2006), it is, for example, helping senior citizens in day-to-day activities, administrative and information activities, professional counseling, but also organizing volunteer programs, leisure, cultural and educational activities or close cooperation with medical staff, participating in business meetings. A social worker in institutional geriatric care is in daily contact with the population of the facility, whose job is to help overcome the various difficult situations associated with their placement in the home for older people. Prior to joining the facility, a social worker

should get as much information as possible about hi/her social situation, family circumstances, or health status, and with his/her client, his family, try to find the most appropriate solutions. According to Ružička (2010), the work of a social worker in the field of institutional care takes on the importance especially during the period of adaptation of the client to the new environment. Social worker then helps the senior to overcome feelings of uselessness and exclusion from active lifestyles. "If the placement in the senior establishment is the most appropriate alternative, the social worker continues to collect data about the resident and, in cooperation with other employees, creates the most suitable program, activities, sets an individual plan for his personality development." In the case of guardianship, it is also the ability of communication, respectively communication with the senior and his / her family members, provision of food and regular drinking regime, accompanying, but also home help, medication, positioning assistance and more. Client-to-client communication is only one, though, a significant dimension. Other notable attributes are interaction and perception. Mojtová (2008). In the case of severely ill, lame or very old seniors, geriatric care is oriented mainly to the biological needs of the client, including, i., minimizing physical pain, preventing decubitus, regular hygiene, securing the diet and drinking regime, but also providing as much comfort as possible and adequate relaxation and movement regime.

## METHODS

### Objectives of research

The main objective of the research was to analyze and compare the resulting values of the socio-economic aspects of the quality of life of seniors living in the home environment and the quality of life of seniors who are clients of social services facilities in Slovakia. As an additional purpose, we have determined to measure the age-old experience of seniors' experiences and to compare this depending on whether or not the senior is a client of a social service facility. At the beginning of the research project, we asked several questions. The main one was the question about the factors influencing the quality of life of seniors in Slovakia, especially its socio-economic level. However, in order to find the answer to the question, it was necessary to examine not only one (social-economic), but all the dimensions, respectively the quality of life of older people. These are closely interconnected and interact with one another.

### Research methods and characteristics of the research sample

Empirical research had the character of quantitative analysis. A modified and shortened version of the WHOQOL-Old questionnaire containing 15 questions was used to collect data. We have added this to questions on the discovery of demographic data from respondents (age, residence, education and status of the client of social services or institutional care) and the question of age discrimination. With this we asked the seniors specifically whether they personally met discrimination on the basis of age. To evaluate collected data, we used a descriptive analysis, pivot tables, graphs, and so on. To verify the hypothesis, the nonparametric chi-quadrade. A survey sample was made up of 224 respondents - seniors aged

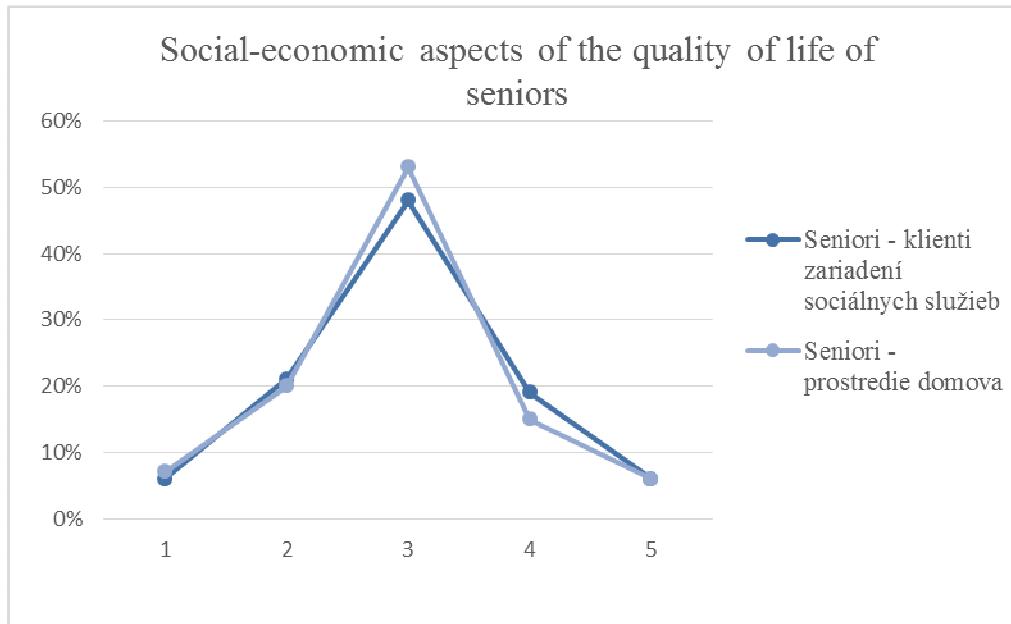
62 and over. At the time of our survey, 42.4% of the respondents were in institutional care, with the remaining 57.6% of the respondents being seniors living in their own homes. The ensemble contained 65.6% of women and 34.4% of men. The average age of respondents was 65.7 years.

## RESULTS AND DISCUSSION

Questions in the WHOQL-Old questionnaire version were categorized into the following areas:

- psychological aspects - Q5, Q10, Q11, Q15,
- physical health issues - Q2, Q3, Q4, Q13,
- social-economic aspects, incl. social environment, interactions, security, access to information and material security - Q6, Q7, Q8, Q9, Q12, Q14,
- overall satisfaction with quality of life - Q1.

In the following part of the text we present the results of social-economic aspects, respectively quality of life of seniors in Slovakia, as well as their comparison depending on whether they are senior or non-client of social services facilities. In addition to client status, the indicator was the quality of life by respondents using the Likert scale from 1 to 5.



**Chart 1** Social-economic aspects of the quality of life of seniors – Comparison based on the status of the client of the social services facilities

**Table 1** Social-economic aspects of the quality of life of seniors (observed)

Seniors	<i>negative values</i>					TOTAL
	1	2	3	4	5	
Clients of social services	7	10	38	26	14	95
In home environments	14	18	50	37	10	129
TOTAL	21	28	88	63	24	224

**Table 2** Social-economic aspects of the quality of life of seniors (expected)  
 Seniors negative positive TOTAL values

Seniors	<i>negative values</i>					TOTAL
	1	2	3	4	5	
Clients of social services	8,91	11,88	37,32	26,72	10,18	95
In home environments	12,09	16,13	50,68	36,28	13,82	129
Total	21	28	88	63	24	224

**Table 3** Social-economic aspects of the quality of life of seniors (chi test)

Clients of social services	0.408	0.296	0.012	0.019	0.01435
In home environment	0,300	0,218	0,009	0,014	1,057

$$\chi^2 = 3,769$$

Hrozenska (2011, p. 43) states that "a society can provide senior citizens with accommodation, food and medical care, trying to fill the day with the program, but can not provide emotional background and feeling that he or she is needed and there is still someone for whom to live for." We believe that staying in may also be a trigger for the elderly such negative emotions as anxiety, insignificance, or stress, which, incidentally, can also lead to the anonymity and uniformity of the institutions. On the other hand, however, seniors who are clients of social service facilities are positively appreciating the fact that they are living in a collective and do not feel lonely. Their contact with other people has also improved, they live their lives in dignity and they can make more of their hobbies and leisure activities. Most things are taken care of in facilities, and thus they have much less common worries. For this reason, and as can be seen from the tables and the calculated chi-quadrade value (3,796), to the degree of satisfaction with the quality of life in socio-economic aspects, there are no senior citizens - social service clients and seniors living in home environment, significant difference.

Our next goal was to find out the level of seniors' experiences with discrimination depending on age and compare this depending on whether or not the senior is a client of a social service facility. Comparison of detected data, it is the experience of senior with ageism, depending on the status of the social service facility client, is displayed using the following table.

**Table 4** Experience of senior with ageism depending on the status of the client of social services (frequency table)

Experience with ageism	n	Seniors			
		Social services clients		In home environments	
		n <sub>i</sub>	f <sub>i</sub>	n <sub>i</sub>	f <sub>i</sub>
Yes	105	54	56,8	51	39,5
No	119	41	43,2	78	60,5

n<sub>i</sub> absolute frequency, f<sub>i</sub> = relative frequency

Approximately half (46.9%) of all interviewed respondents reported their personal experience of age discrimination. However, as shown in the table above, older seniors who are clients of institutional facilities (56.8%) have more experience with this negative phenomenon. It is clear from practice that the human rights of seniors are not sufficiently secured through the current legal system. Elderly people often do not know them, either. They are not aware of their rights and if they are, they can not adequately defend them. The most vulnerable groups among seniors include women, unemployed, disability pensioners, or very old seniors. These groups, especially disabled and very old seniors, who are no longer employed, make up most of the clients of social care facilities.

## CONCLUSION

With regard to the senior population, the term of quality of life is becoming increasingly common, with many factors influencing the quality of life of seniors.

These are factors of the internal and external environment, subjective and objective, which can be further categorized as medical, psychological or social-economic. Then it is the very process of aging, which contributes to a great extent to how old you feel or what is the quality of our lives. It depends on how we get old. The aim of an active preparation for an old age is to survive the final stage of life in the best possible physical condition and mental health. However, fulfilling this effort is not as easy as it might seem at first glance. In an individual's level, it is not enough to start learning the concept of active aging just before reaching seniority. Active aging and the opportunity to apply your potential during this period need to be prepared during the whole time in your life. As far as the all-society level of aging is concerned, we also encounter many barriers, obstacles and, last but not least, the prejudices of the majority. The value system of today's society is set in a way that highlights the biologically-conditioned competencies of youth and attributes such as performance, vitality, energy, or others, while the negative attitudes are retained in the old age. Similarly, the social status of seniors is included in the inefficient category of old-age pensioners by society, with the result that elderly people are disadvantaged and confronted with a constantly changing social environment. They are unlucky enough to find themselves in such hard situations and they have no power to find a way out. However, it is necessary to realize that the senior population is an integral part of society and has a huge potential not only for employment but also for active participation in the life of all social structures. Equally important is the senior population in social work, for which it is not only the target, the subject, the clientele, or in

other words the provider of the care, assistance and services, but also the provider, both on a volunteer and a professional basis. The aim of social work is to provide elderly people with adequate help, based on knowledge and respect for their rights and needs, to improve the quality of their lives in every level, and to provide senior citizens with conditions in the social environment that will enable them to survive in dignity and, above all, happily.

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