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Ефект на продължителността на съня върху клиничната проява на някои неврологични заболявания

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Effect of sleep duration on the clinical manifestation of some neurological diseases

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РЕЗЮМЕ:

Ролята на съня е с увеличаваща се значимост за поддържане на здравето и профилактиката на заболеваемост. Циклите на сън и бодърстване се контролират от активността на супрахиазматичното ядро в хипоталамуса, катопроцесът е сложен и включваредицамедиатори, коитоимат участие и в другиневроналнисистеми. Нарушенията на сънямогат да нарушат някоиневроннипътища и по този начин иматефектвърхуредицаневрологичнизаболявания. Освентова, липсата на сън е свързана с увеличаване на смъртността при редицазаболявания. В настоящия обзор смеразгледалиролята на продължителността на съня върху неврологични заболявания като епилепсия, мозъчен инсулт, болест на Алцхаймер, множествена склероза, главоболие, невропатнаболка и фибромиалгия.

Ключови думи: продължителност на съня, неврологични заболявания, супрахиазмено ядро.

ABSTRACT:

The role of sleep is of increasing importance for maintaining health and preventing morbidity. The cycles of sleep and wakefulness are controlled by the activity of the suprachiasmatic nucleus in the hypothalamus as the process is complex and involves several mediators that are involved in other neuronal systems. Sleep disorders can disrupt some neural pathways and thus affect the number of neurological diseases. Besides, the lack of sleep is associated with increased mortality in the number of diseases. In this review, we looked at the role of sleep duration in neurological diseases such as epilepsy, stroke, Alzheimer's disease, multiple sclerosis, headache, neuropathic pain, and fibromyalgia.

Keywords: sleep duration, neurological diseases, suprachiasmatic nucleus.

INTRODUCTION

Sleep deprivation is common in modern society, but it is all-encompassing effects are still the subject of various scientific studies. Although there is widespread agreement that insufficient sleep leads to a general slowdown in reaction speed and increased variability in work, especially for alertness and attention, there is much less agreement on the effects of sleep deprivation on much higher levels of cognition, including perception, memory and executive functions. The key question is whether sleep deprivation affects almost all cognitive abilities globally through impaired alertness and attention, or whether sleep loss specifically impairs some aspects of cognition more than others. [42, 47, 48] Neuroimaging techniques have found that decision-making and planning tasks are relatively unaffected by sleep loss, but the more creative, diverse, and innovative aspects of cognition appear to be impaired by sleep deprivation. Evidence has shown that some aspects of higher-level cognitive abilities remain impaired by insomnia, despite the restoration of alertness, suggesting that sleep loss may affect specific cognitive systems above and beyond the effects of global cognitive decline or impaired attention processes. [12,13] For example, in patients with obstructive sleep apnea (OSA), psychomotor speed, attention, executive functions, and memory impairment are most affected, which are most evident in immediate repetition, meaning that the coding of the information suffers or is due to attention deficit disorder. [40, 44, 45, 46, 51] The role of emotion as a critical aspect of cognition has attracted increasing attention in recent years, and more and more evidence suggests that sleep deprivation may particularly affect cognitive systems that rely on emotional data. Thus, the extent to which sleep deprivation affects a particular cognitive process may depend on several factors, including the magnitude of the global decline in general alertness and attention, the extent to which a particular cognitive function depends on emotion processing networks, and the extent to which cortical regions for compensatory support are affected. Research shows that participants in a study after sleep deprivation were able to be more inclined to maintain attention on alert tasks than cognitive tasks. [39, 47, 48]

The circadian rhythm (CR) is the cyclical nature of the body's desire for sleep. The hypothalamus controls it through the suprachiasmatic nucleus (SNR) with sensory input from the retinohypothalamic tract based on light levels coming from the retina. [22] Melatonin, produced in the pineal gland, is also shown to modulate (CR), with concentrations varying in light levels (highest at night and decreasing during the day). Some of the studies also prove the participation of body temperature in (CR). It varies from person to person, but it is expected to have lower temperatures in the morning and higher in the evening. The basal forebrain is also involved in the sleep-wake cycle, while part of the midbrain acts as an excitatory system. [1, 2,3, 4] The release of adenosine (a chemical byproduct of cellular energy consumption) by cells in the main forebrain aids in the onset of sleep. [42] Caffeine counteracts sleepiness by blocking the action of adenosine. The amygdala, involved in the processing of emotions, is increasingly active during REM sleep.

Alzheimer's disease is a chronic neurodegenerative disease that usually develops slowly and gradually worsens over time, It causes 60% to 70% of dementia cases. Accumulation of beta-amyloid is associated with impaired brain function and Alzheimer's disease. In Alzheimer's disease, beta-amyloid groups form together, forming amyloid plaques that interfere with communication between neurons. Studies show that sleep plays a role in clearing beta-amyloid from the brain. Also, lack of sleep has been shown to increase beta-amyloid levels in the brain of mice. In a study involving 20 healthy participants aged 22-72 years, using positron emission tomography (PET), the level of beta-amyloid was measured twice. The first measurement was made after a night of restful and effective sleep, and the second - after 31 hours of sleep deprivation. Beta-amyloid increases by about 5% in the participants' brains after sleep loss. These changes have occurred in brain regions, including the thalamus and hippocampus, which are particularly vulnerable to damage in the early stages of Alzheimer's disease. Besides, participants in the study with a hig-

her increase in beta-amyloid reported worse mood after sleep deprivation. These findings support other studies that find that the hippocampus and thalamus play a role in mood disorders. This study provides new insight into the potentially harmful effects of sleep deprivation on the brain and has implications for better characterization of Alzheimer's disease pathology. [36]

The Stroke is a rapidly evolving clinical sign of focal impairment of cerebral function that lasts more than 24 hours. Stroke is the leading cause of death and disability worldwide. Sleep is considered to be one of the main risk factors. Various epidemiological studies have linked stroke to sleep duration. The pathophysiology is multifactorial and sleep affects many risk factors associated with stroke. Various aspects of sleep are considered, such as the duration and quality of sleep and respiratory disorders, some of which are more severely influential and affect the diseases described above. Breathing disorders such as sleep apnea lead to many awakenings, which in turn affect sleep. This can be explained by nocturnal hypoxia. Nocturnal hypoxia is the cause of attention disorders, psychomotor speed, and memory disorders in these patients.[45, 46, 12,13] By consensus, the ideal amount of sleep is about 7 hours. [43] Insomnia has a serious impact on the functioning of the body. In animal studies, prolonged sleep deprivation has been shown to reduce plasma levels of thyroid hormones, reduce resistance to infections, cause negative energy balance, and impair brain function.[15] In clinical trials, insufficient and excessive sleep has been associated with an increase in cardiovascular incidents. Sleep duration of fewer than 7 hours increases the risk of stroke. [49]

Hypertension is considered a leading risk factor in stroke. Studies report a link between sleep duration and hypertension. [24] Sleep duration <7 hours or> 8 hours is associated with an increased risk of hypertension, suggesting that the relationship between sleep duration and hypertension follows a U-shaped curve. The main pathophysiological mechanism linking sleep duration and hypertension is probably related to the sympathetic nervous system. In patients with hypertension cute sleep deprivation increases both mean 24-hour blood pressure and heart rate, as well as urinary norepinephrine in the morning after a sleepless night. Blood pressure usually drops at night. Patients who do not have a normal reduction in blood pressure are thought to have a higher risk of stroke. [30] A 5% decrease in nocturnal blood pressure reduction was associated with a 20% increase in cardiovascular mortality.

Sleep duration <6 hours per day is associated with a 30% increase in the risk of diabetes, and in patients with pre-existing diabetes, sleep disturbances are associated with impaired glycemic control.[23] Potential mechanisms are increased sympathetic nerve activity, leading to decreased beta-cell response and decreased glucose tolerance. Decreased cerebral glucose uptake by chronic insomnia may lead to higher peripheral glucose concentrations and ultimately facilitate the development of insulin resistance. [3, 6] A study with participants whose sleep was limited to 4.5 hours in 4 days established by a 23% reduction in insulin sensitivity. [49] Insomnia, on the other hand, also affects obesity, which in turn increases the risk of stroke. Lack of sleep lowers the amount of the satiety hormone leptin and increases appetite-stimulating hormone. It is also possible that sleep deficiency and fatigue to reduce physical activity during the day and thus reduce energy consumption. [5]

Atrial fibrillation is a major risk factor of stroke. Prolongation of the duration of P-waves and their dispersion, representing inhomogeneous conduction from the sinus node, is observed in elderly people with sleep disorders. Decreased REM sleep increases the risk of atrial fibrillation. [28]

Parkinson's disease is a neurological disease characterized by the degeneration of dopaminergic neurons in substantia nigra. Insufficient sleep can lead to Parkinson's-like symptoms. [17] A study was conducted of dopamine metabolism in animals to which rotenone has been administered. Rotenone is a pesticide that inhibits mitochondrial function, leading to cell death and Parkinson's characteristics. Compared to control animals, those treated with rotenone had lower levels of dopamine in the brain. However, sleep

deprivation does notfurther reduce dopamine concentrations. DOPAC, the basic metabolite of dopamine, decreased after treatment with rotenone but recovered after sleep deprivation. High levels of two types of dopamine receptors (D2 and D3) were observed when treated with rotenone compared to the control group. Interestingly, the levels of these same receptors decrease significantly after sleep deprivation. In patients treated with rotenone, the metabolic process of DA appears to increase significantly after sleep deprivation. The most common disorder is due to sleep fragmentation.

Polysomnographic studies show increased sleep latency and frequent awakenings lasting 30-40% of night-time sleep. The latency of sleep and the frequency of awakenings increase in proportion to the severity of Parkinson's syndrome.

Epilepsy is a chronic disease characterized by recurrent epileptic seizures - a clinical manifestation of an abnormal or increased electrical discharge in the neurons of the brain. Sleep deprivation can also increase the incidence of seizures in epileptics and provoke epileptic seizures in undiagnosed patients. Some people have their first and only seizures after not sleeping well for long periods. If you have epilepsy, the lack of „good sleep" makes most people more likely to have seizures. It can even increase the intensity and duration of seizures. Some forms of epilepsy are particularly prone to sleep disorders. Sleep can affect seizures in many different ways. During the normal cycle of sleep and wakefulness, changes in the electrical and hormonal activity of the brain are observed. This may explain why some people have more seizures than others during sleep. Seizures during sleep, falling asleep, or waking up is possible. Sleep activates electrical charges in the brain, which lead to seizures, and seizures are synchronized according to the sleep cycle. This is especially true for benign focal epilepsy in childhood (Roland's epilepsy). Some seizures can lead to waking up, which is often interpreted as insomnia. Often patients do not know about the attack during sleep. They may suffer from years of fatigue and changes in concentration without knowing why. Epilepsy disrupts sleep, and insomnia aggravates epilepsy. Medications for epilepsy also affect sleep. A study of sleep patterns in children with epilepsy compared with their siblings who do not suffer from epilepsy shows that children with epilepsy have more episodes of sleep disorders and that it is associated with more attention problems, quality of life. [25] They also have a higher rate of attention deficit hyperactivity disorder and other learning difficulties, emotional and behavioral problems compared to children without epilepsy. EEG shows that epileptiform activity increases during sleep. EEG after sleep deprivation shows more epileptiform manifestations than EEG of people without sleep disorders, which suggests that sleep deprivation is an independent activator of epileptiform manifestations. [2]

Myasthenia gravis (MG) is an autoimmune disease caused mainly by antibodies against nicotinic acetylcholine receptors on the skeletal muscle (nAChRs) of the postsynaptic membrane. The prevalence of sleep disorders in patients with neuromuscular disorders has not been well documented in the literature and symptoms such as daytime drowsiness and fatigue are often attributed to neurological disease. Some studies have reported poor sleep quality, excessive daytime sleepiness, limb movements during sleep, and sleep-disordered breathing (SDB), bound up with MG.

One follow-up study whose goal was to determine the prevalence of Restless Legs Syndrome (RLS) included 73 patients with MG and 65 healthy participants from the control group. The results showed that 43.2% of MG patients had RLS compared with 20% of the controls. Therefore, they concluded that RLS is more common in patients with MG than in the general population. [37]

A targeted study was also conducted on the prevalence of SDB in patients with clinically stable MG. Among the 19 patients with MG 4 of them had an apnea-hypopnea index without central events. A high prevalence of SDB has been observed in patients with MG, especially during REM sleep. SDB in patients with MG is a demonstration of central and peripheral cholinergic symptoms. Some studies have reported that variations in disease status and

MG antibody types may also affect the severity of SDB and sleep apnea (eg, Anti-MuSKR-Abs is initially associated with OSA and hypoventilation).

The generalized hypothesis of cholinergic insufficiency has been proposed by some authors as a cause of sleep and other central nervous system abnormalities with MG. [32] This proposal is also supported by the following: reduction of REM sleep and increase of oropharyngeal, intercostal and diaphragmatic muscle weakness, the predominance of sleep apnea, hypopnea, and hypoxia. ACh is the putative substance of the brain transmitter involved in maintaining REM sleep. In general, sleep apnea is common during REM sleep. This may be related to the key role of the central cholinergic system in sleep-wake rhythms and the regulation of REM sleep, sleep perception and dreaming. The increase in OSA [45-48] during REM sleep is due to the natural loss of intercostal muscle tone during this period. Other evidence for central nervous system abnormalities in MG and sleep disorders is the detection of AChR-Abs in the cerebrospinal fluid in patients with MG and the presence of structural identities between different nAChRs subunits (ie, muscular and neuronal subunits) with the possibility of cross-linking. reactivity between anti-nAChR α1 antibodies and other nAChR subunits. Others suggest that the central nervous system manifestations and sleep-related conditions in patients with MG are caused by peripheral mechanisms that include respiratory and oropharyngeal muscle weakness, AChE-Is adverse effects, and psychiatric manifestations.

Multiple sclerosis (MS) is a chronic inflammatory and neurodegenerative disease of the central nervous system, that most commonly affects young people. It is characterized by neurological symptoms leading to long-term physical impairment.

Poor sleep is a common symptom in patients with multiple sclerosis. Studies show that up to 40% of MS patients may be at risk of insomnia. Emerging evidence links sleep disorders to cognitive dysfunction in MS. [18] Sleep problems are more common in the MS population than in the general population, ranging from 25% to 54%. [31] Sleep disorders such as insomnia, RLS, SDB, narcolepsy, and REM sleep have been all reported in MS. The presence of RLS seems to be the main factor determining poor sleep, fatigue, and daytime sleepiness. Breathing with disturbed sleep and its severity only affect fatigue in patients with MS.[18]

Several studies are suggesting that RLS is 3 times more common in patients with MS than in the general population. [35] The reason is still unclear. Current concepts for RLS suggest dysfunction of the dopaminergic system, spinal pathogenesis leading to disruption of the descending and ascending hypothalamic-vertebral pathways. Cervical involvement has been reported to correlate with RLS in patients with MS.

Neuropathic pain is a complex, chronic pain condition that leads to damage to the nerve endings, in which false signals are transmitted to the pain center. The relationship between neuropathic pain and sleep disorders is twofold. Patients with neuropathic pain are more likely to develop sleep disturbances and in turn, the pain is exacerbated by lack and/or poor quality of sleep. A positive correlation between pain sensitivity and the frequency/severity of insomnia and a synergistic reduction in pain tolerance has been reported in patients with chronic pain and insomnia. [7]

The predominant sleep disturbance in patients with chronic pain varies from 50% to 80%, and the severity of sleep disturbance is related to the intensity of the pain. The impact of neuropathic pain on the quality of sleep has been studied directly. [1] One study found that 68% of patients with neuropathic pain had „severe" or „mostly" sleep disturbances. Patients with postherpetic trigeminal neuropathy have reduced sleep efficiency with shorter REM and NREM stages 3 and 4. [34] In trigeminal nerve dysfunction after trauma, patients are 4 times more likely to wake up during sleep than subjects without trigeminal neuropathy.

It is estimated that the prevalence of sleep disorders in patients with chronic pain varies between 50% and 80%. The study compared 70 patients with chronic back pain with a control group of 70 healthy individuals, corres-

ponding to gender and age, comparing sleep disorders, pain, and various psychological variables, including anxiety and depression. The results show that 53% of patients with chronic pain show evidence of clinical insomnia and only 3% of controls meet the criteria for insomnia. Also, the severity of insomnia is positively related to the intensity of pain, general anxiety, and depression. [49] In another study, 2,159 patients with chronic pain were evaluated for a history of sleep disturbance. In this group, 79% met the criteria for significant insomnia based on self-reported symptoms.

Pain tolerance is further reduced synergistically in individuals who report both chronic pain and insomnia. [27] Clinical studies have shown that patients with chronic pain who report sleep disturbances also report increased pain, increased fatigue, low mood, and generally higher levels of stress and disability. [38]

Headaches associated with nighttime sleep are often perceived as the cause or result of disturbed sleep. Recent biochemical and functional imaging studies in patients with primary headache disorders have led to the identification of potential central generators that are also important in regulating normal sleep architecture. Reviews of clinical and epidemiological studies suggest a greater prevalence of sleep disorders in individuals with certain types of headaches. Also, chronic daily headaches or waking headaches suggest sleep disturbances. [16]

There is a direct link between primary headaches and sleep disorders, especially when these headaches occur at night or when waking up. The main headaches most commonly associated with sleep are migraine, cluster headache, tension headache, hypnotic headache, and chronic paroxysmal hemicrania.

The regulation of the sleep-wake cycle is mediated by the interaction of various neural systems and their respective neurotransmitters, components of which are involved in pain control systems. In general, pain affects sleep and vice versa. It has been found that primary headaches without a clear etiology can be caused by a short or longer period of disturbed sleep. Sleep is also effective in relieving symptoms: 85% of people with migraines report choosing to sleep or rest because of a headache, and many are forced to do so. [26]

Anatomical, biochemical, and physiological data support the inherent relationship between normal sleep physiology and the genesis of headache in biologically predisposed individuals. These data indicate common pathophysiological aspects of sleep, pain (headache), and mood swings, which include the hypothalamus, serotonin, and melatonin. Preliminary studies show that headaches are associated with REM sleep and an increase in the rate of REM and SWS (slow-wave sleep).

There is a complex relationship between sleep and migraine, and sleep disorders and migraines are often comorbid conditions. Migraines are severe, usually unilateral headaches that often present with symptoms such as photophobia, phonophobia, nausea, vomiting, mood disorders, and sensory disturbances. They are closely related to sleep and migraines can occur during nighttime sleep, after short periods of daytime sleep and when waking. Sleep problems are 3 times more common among patients who report migraines. [41] Migraine crises can be caused by sleep deprivation or too much sleep, but they often improve or disappear after sleep. [26] These crises are not related to a specific stage of sleep: they can occur during REM sleep or outside this period. They are more likely to occur after prolonged periods of the SWS stage and / or after waking up from REM sleep. The cyclical nature of the attacks and their relationship to fixed periods (sleep, menstruation, a season of the year) and sunny days show circadian mechanisms controlled by the hypothalamus.

Sleep disturbances are also associated with more severe and frequent migraines. Sleep disorders are thought to contribute to the conversion from episodic migraine (less than 15 migraines per month) to chronic migraine (15 or more migraines per month) in certain people.

Insomnia is among the sleep disorders most commonly associated with migraines and is present in one-half to two-thirds of migraine sufferers. [26] People with migraines

report increased symptoms of insomnia between migraine attacks, including poor sleep quality, difficulty falling asleep and sleeping, feeling tired after waking up, waking up too early, feeling sleepy during the day, and getting less sleep than usual. Furthermore, many migraine patients claim to have been woken up from a deep sleep by a severe headache. Migraines are associated with a higher risk of insomnia, and most people with chronic migraines say they have insomnia almost every night. [14]

The incidence of parasomnias is significantly higher in migraine patients than in the general population. Recent studies have found a higher incidence of RLS in migraine patients. Furthermore, because dopamine is involved in the pathogenesis of both conditions, this association could support the hypothetical dopaminergic imbalance in RLS and migraine. [8]

Headache is often a symptom of OSA [45, 46, 47, 48], and snoring, which is also a symptom of sleep apnea, is a risk factor for chronic migraines. Studies in both children and adults have found that waking up with a migraine is associated with snoring, breathing problems, and sleep apnea. [19] There is no evidence that OSA is more common in migrants than in the general population. Nonetheless, the presence of OSA [45-48] appears to contribute to more severe migraines. One theory suggests that migrants, already sensitive to pain, have a harder time coping with headaches that result from reduced oxygen intake at night. A study of 11,699 people with episodic migraines and 111 with chronic migraines found that, compared with those with episodic migraines, more chronic migraines were at high risk of OSA and were more likely to report the poor quality of sleep.

Bruxism is common in disorders of the temporomandibular joint (TMD), which is often common comorbidity of migraine. Bruxism is associated with both episodic and chronic migraines, although it is not clear what the connection is. One theory states that TMD and bruxism activate the trigeminal nerve, a cranial nerve thought to be involved in migraines. Another possibility is that migraines are more sensitive to the pain that TMD and bruxism can cause due to central sensitization.

Like dopamine, serotonin is an important neurotransmitter that is associated with sleep, mood, appetite, and vasoconstriction. In terms of sleep, serotonin is thought to contribute to wakefulness and interfere with REM sleep. In migraines, studies show that serotonin levels are lower between migraines, but during migraines, levels rise, probably contributing to nocturnal awakenings.

The brainstem can also play a role in the correlation between these two conditions. On the one hand, it is believed that serotonin is produced in this brain structure. On the other hand, studies show that in migraines with insomnia, there may be a dysfunction in the brainstem that prevents the transition between stages of sleep. The hypothalamus in imaging studies shows increased activity in the hours before the onset of a migraine.

Cluster headache (CH) is severe, excruciating, stabbing, always unilateral, and usually retroorbital. Lack of sleep has long been associated with heart failure. Initial observations indicate that patients often or always report the onset of HF during sleep, with pain. Seizures usually occur in the first episode of REM sleep. Pain may also begin in stages 2 and 3 of NREM sleep, and patients may suffer from decreased REM sleep and increased SWS during a cluster headache. The influence of the stages of sleep suggests hypothalamic participation, in particular of SCN, in the general pathophysiological processes of sleep and headache. Researchers believe there is a link between HF and poor regulation of the sleep-wake up cycle, including the biological clock, especially in REM sleep. These abnormalities are associated with pathological changes in the posterior hypothalamus.

Tension headaches can be episodic or chronic. It is characterized by 10 headaches lasting from 30 minutes, up to 7 days, and at least 2 of the following characteristics: a feeling of pressure, low or moderate intensity, bilateral, not worsened by physical activity. Neurological and clinical examinations should be normal. Hypersomnia, nocturnal bruxism, and RLS are associated with a higher incidence of tension headaches. Sleep fragmentation and / or increased muscle activity during sleep is the likely mechanism in these patients.

Hypnic headache is a rare type of primary chronic headache that occurs exclusively during sleep, usually in people over 50 years of age, and its pathophysiology has not been established. It is characterized by mild to moderate pain that wakes the patient. These headaches occur more than 15 times a month and last 15-180 minutes. This is the only type of headache that is strictly related to sleep (both day and night) and that wakes the patient. A link has been suggested between waking up and having a headache during slow-wave sleep, REM sleep, or during night desaturations. [11] Because hypnotic headaches usually begin after the fifth or sixth decade of life, their pathophysiology may be related to age-related changes in sleep patterns, such as more frequent awakenings and marked reductions in SWS. [11] The association with hypothalamic dysfunction is considered an important pathophysiological mechanism for this type of headache, as waking up suggests a sleep-waking cycle disorder. This type may also be associated with decreased melatonin. However it is important to mention that melatonin secretion is also reduced in other primary headaches, including migraine and cluster headache.

Chronic paroxysmal hemicrania (CPH) is a rare syndrome that usually presents as a relatively brief unilateral attack of severe pain followed by trigeminal autonomic symptoms. The pain occurs mainly in the ophthalmic trigeminal region, but other parts of the head may also be affected. There is no preferred time of day when this type of pain begins, but when it occurs during sleep, it is usually associated with REM.

Fibromyalgia (FMS) is a medical syndrome that causes widespread pain and stiffness in muscles and joints, as well as sleep problems and chronic fatigue during the day.

Difficulty sleeping at night has been shown to predict increased pain during the day, but daily pain measures do not predict worse subsequent sleep, ie. sleep may be an etiological factor for FMS symptoms. Sleep problems, including insomnia, restlessness, poor quality, and unrecoverable sleep, are all common among people with FMS. In one study, researchers selectively deprived a group of healthy middle-aged women of slow sleep for three days. In response, women showed decreased tolerance to pain and increased levels of discomfort and fatigue, suggesting that such a sleep disorder may play an important role in the development of FMS symptoms.

It has been found that 99% of patients with FMS suffer from poor sleep quality, which affects the severity of physical pain and fatigue, and leads to difficulties with social functioning. Poor sleep lowers pain thresholds, leading to greater sensitivity to pain. Insufficient sleep disturbs the emotional balance and emotional resilience.

OSA present in half of the group of patients with FMS. RLS also occurs with a higher incidence in people with FMS. A recent study found that RLS occurs in more than 42% of patients with FMS. [4]

EEG analysis showed that patients with FMS took longer to fall asleep and had frequent arousals, prolonged stage 1 sleep, and decreased NREM sleep. Their increased brain activity seems to keep them in the lighter stages of sleep, where they can wake up twice as often. This lack of restorative NREM sleep may explain the fatigue, physical pain, and „brain fog" that people with FMS experience. Besides, when depressed, patients with FMS reported lower levels of activity and increased sleep during the day and significantly more sleep interruptions at night.

Sleep problems have been linked to both depression and pain in patients with FMS in numerous studies. [21] Sleep problems can affect the neuromatrix by affecting other systems, such as the immune system. Support for this theory comes from research that suggests that sleep may affect the neuromatrix through its effects on intervention systems. Specific to FMS, research shows that good sleep quality can soften the link between effect and pain.

Conclusion: The quantity of sleep has a serious impact on the normal physical and neuropsychological state of a person. It is largely assumed that the role of sleep is to support the function of synaptic reorganization. There has been a connection established between „good" sleep and the development and course of many diseases. Physiological mec-

hanisms underlie sleep homeostasis. The cellular and molecular basis of sleep affect its duration, and this, respectively, affects the development of various diseases that adversely affect the human body. Studies in this field show that the duration of sleep also affects the expression of genes responsible for the production of various types of proteins acting at the cellular level of the body. Sleep in some cases plays the role of a trigger for the development of diseases, in other cases it worsens the course of an existing one. Despite numerous studies on the role of sleep and the maintenance of physical and mental health, questions remain about the exact pathophysiological mechanisms. The subject of further research is how and exactly which cognitive functions are impaired during sleep deprivation; the specific mechanism of beta-amyloid accumulation in the thalamus and hippocampus in disturbed sleep; the interdependence between sleep and increased brain activity. It is not yet clear whether the imbalance of various neurotransmitters and hormones (catecholamines, acetylcholine, serotonin, and melatonin) leads to sleep disorders or vice versa - disturbed sleep is the basis of their disturbed balance.

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Различни аспекти от проследяването, изследването и лечението на острия радиационен синдром

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Different aspects of the assessment, observation and medical treatment of the acute radiation syndrome

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РЕЗЮМЕ:

Острия радиационен синдром е специфично медицинско понятие, комбиниращо в себе си симптоми от различни системи водещи в клиничната картина и определящи терапевтичния подход. Оценката се определя от строго определени протоколи одобрени от Международната Атомна Агенция. Най-съществената част от оценката е да се определи абсорбираната доза след облъчването (лимитиращата доза за остър радиационен синдром е повече от 1Gy) типа на йонизиращото лъчение и каква част от тялото на пострадалите е била облъчена. Следващата стъпка е лечението на пациента, което се определя от погълнатата доза, мощността и типа на лъчението и състоянието на пациента. Пациенти облъчени целотелесно с висока доза гама лъчи (> 1Gy и < 10 Gy), биха били разпределени в три различни групи по време на медицинската сортировка: такива които ще се възстановят без никакво съпътстващо лечение, пациенти при

ABSTRACT:

Acute radiation syndrome is a special medical condition that combines symptoms of four different sub-syndromes combined or separately. The assessment of the acute radiation syndrome follow strictly defined protocol approved by IAEA. The most important part of the assessment is to calculate the absorbed dose after the exposure and the type of the irradiation such as whole-body or significant partial body exposure to over limited dose (> 1 Gy absorbed dose). The next step is the medical treatment of the patient. The treatment of the acute radition syndrome depends on the patient condition, dose rate and the type of irradiation. Patients who received a high dose and whole body irradiation (> 1Gy and < 10 Gy) are going to be triage to three different groups: patients, who recover with minimum interventions, those who require aggressive supportive treatment such as bone-marrow transplantation and those, who will receive palliative care. The possibility of local or systematic infection increased with

които ще се проведе агресивна заместителна терапия, включително и костномозъчна трансплантация, и такива които ще получат само палиативно лечение. Възможностите за възникването на инфекциозни усложнения, нарастват пропорционално с дозата на облъчване, поради общото увреждане на организма, увреждането на естествените бариери и настъпващата имуносупресия. Лечебните протоколи включват изпалзването на широкоспектърни антибиотици, антивирусни препарати и антимикотици.

Ключови думи: остър радиационен синдром, оценка на дозата, лечение, дицентрици.

the irradiation, because of the appeared damages in the cutaneous and mucosal barriers and immune system suppression. To prevent the risk of infections in the medical treatment scheme have to be included antibiotics, an antiviral and antifungal drugs. The application of the antimicrobial drugs follow three different approaches depends on the medical condition of the patient.

Key words: acute radiation syndrome, dose assessment, dicentric, antibiotic, medical treatment.

INTRODUCTION:

The acute radiation syndrome (ARS) is a special medical condition that occur after whole-body or significant partial body exposure to over limited dose (> 1 Gy absorbed dose). ARS can involve the hematopoietic, cutaneous gastrointestinal and the neurovascular organ systems, either individually or in combination. The development of the ARS and the severe of the symptoms are in direct correlation with the absorbed dose. The ARS includes four different sub-syndromes: first is the hematopoietic syndrome (absorbed doses >2-3 Gy), the second is gastrointestinal syndrome (absorbed dose 5-12 Gy) and the last one is cerebrovascular syndrome (absorbed dose 10-20 Gy). Those four syndromes could occur separately or combined. The survival possibility of the injured individual decrease with the increase of the dose rate. There is no possibility to survive over 10-20 Gy absorbed dose. (1)

The phases of the ARS are prodominal (0-2 days after the exposure), latent (2-20 days) and manifest illness (21-60 days). Radiation injury may occur after external irradiation, external contamination with radiation material, internal irradiation and combination between internal and external irradiation. The clinical picture, because of the radiation damage after the exposure depends on several factors such as the dose rate, the nature and energy of the exposure, the type of irradiation (whole-body or partial irradiation), age, individual health status, etc. (2)

ASSESSMENT OF THE ABSORBED DOSE AFTER THE EXPOSURE:

The first step after radiation incident is the assessment of the radiation-absorbed dose. To assess the dose are going to use three different biodosimetry methods:

- Physical measurement – estimation of the received dose by a whole-body radiation dosimeter;
- Detection of biological and clinical markers – three the most frequently used clinical markers are the time to onset of the emesis, the lymphocyte depletion kinetics and chromosomal aberrations. Monitoring the decrease in absolute lymphocyte count is the most useful practical method to assess the radiation-absorbed dose after hours or days of the radiation exposure. (3)
- Chromosomal changes: has been detected the frequency of the chromosomal aberrations that are used as a biomarker of radiation exposure (dicentrics, chromosomal rings) in lymphocyte cultures of human peripheral blood. (4) The blood sample has to be collected 24 (or later) after the exposure according to the policies of the IAEA manual. The dicentric is the main aberration used for biodosimetry. It is an exchange of chromosomal parts include centromere between two broken chromosomes, which lead to formation of one dicentric chromosome and two acentric fragments. The dicentric assay is performed as a cytogenetic metaphase chromosome

analysis of peripheral blood lymphocytes, stained with Giemsa on microscope slides. (5,6)

The diagnosis of the ARS is difficult to be determined, because it includes many symptoms, which are common with other diseases. The type of sub-syndromes that could occur depends on the received dose and the type of irradiation. Sometimes the prodominal stage could not occur for hours or days after irradiation or the patient to be in the latent stage.

MEDICAL TREATMENT OF THE ARS – GENERAL ASPECTS

The treatment of the ARS depends on the patient condition, dose rate and the type of irradiation. Patients who received a high dose and whole body irradiation (> 1Gy and < 10 Gy) are going to be triage to three different groups: patients, who recover with minimum interventions, those who require aggressive supportive treatment such as bone-marrow transplantation and those, who will receive palliative care. First is going to be obtained the patient clinical history and physical examination, dose rate estimation, supportive care, symptomatic treatment and replacement of fluids and electrolytes as a first medical treatment. Isolation in personal sterile room is necessary for the patients who received whole-body irradiation higher then 2-3 Gy. In those cases, antacids and H2 blockers must be avoided to maintain gastric acidity and sucralfate has to be used to prevent stress ulcers. (7) After the first 48 hours, scoring of the multiple organ failure prediction should be taken, using the monitoring of the cytokines. (8) Surgical intervention, if is required, should be done within 36 hours after the exposure. It has be done until the 48 hours of the exposure. Additional surgery has to be done after six weeks of the first one, in order to assure recovery of cytopenia and the immunosuppression, which lead a risk of surgical complications development (infection and poor wound curing). The use of selective 5-HT3 receptor antagonists has been recommended for radiation-induced emesis. Severe degrees of anaemia and thrombocytopenia occur 2-4 weeks after the exposure. All cellular products used for transfusing have to irradiated with high dose (25 Gy) to prevent transfusion-associated graft-versus-host disease and leukoreduced (except granulocyte transfusions) to diminish the risk of febrile non haemolytic reactions, immunosuppressive effects of blood transfusions, platelet alloimmunization and cytomegalovirus infection.(9) Platelets transfusion therapy depends on patient's condition. Use of erythropoetine (EPO) anaemia therapy is not recommended. Cytokine therapy (such as G-CSF, GM-CSF and KGF) is advisable to administrate in the 24 hours after the exposure, especially in the whole-body exposure of ≥ 3 Gy or with a degree of hematopoietic toxicity over three. (27) Cytokine therapy should be continued for 2-3 weeks or until the absolute neutrophil count is >1000 cells/l.

The possibility of local or systematic infection increased with the irradiation, because of the appeared damages in the cutaneous and mucosal barriers and immune system suppression. To prevent the risk of infections in the medical treatment scheme have to be included antibiotics (levofloxacin, ciprofloxacin, cefalosporines of 3rd or 4th generation or an aminoglycoside such as gentamycine or amikacin), an antiviral (acyclovir) and antifungal (fluconazal) drugs. In case of a fever and significant neutropenia (<500 cells/l neutrophils) wide spectrum of antimicrobial drugs could be applied. Antibiotics for aerobic and anaerobic bacteria have to be included in the therapy. It is suggested to be included a wide broad-spectrum antibiotic, especially against Gram – bacteria in the intestinal tract, such as Enterobacter and Pseudomonas. Gram + aerobic bacteria such as haemolytic Streptococcus could cause septicaemia and wide broad-spectrum antibiotics against them should be included in the scheme. (10, 11)

The first approach is intravenous antibiotic monotherapy of either imipenem/cilastatin, meropenem, piperacillin/tazobactam or antipseudomonal cephalosporin. The second approach is antibiotic combination therapy: aminoglycoside or cyprofloxacine plus penicillin or aminoglycoside plus cephalosporine. The third approach is the addition of vancomycine and monotherapy or combined antibiotic therapy. That medical treatment continues until the patients fails the treatment, appear a neutropenic fever or neutrophil recovery. Special medical

treatment could be included depending on the health status of the irradiated individual (with latent CMV infection, HIV, hepatitis, autoimmune diseases, etc.) (12)

Hematopoietic stem cells transplantation is not suitable for whole-body radiation exposure or if the victims have a potential for endogenous recovery. The suitable patient for transplantation should not to be carried out before the observation period of 14-21 days pass. A limited group of patients, who received high dose of irradiation (3-10 Gy), eventually could be suitable for transplantation. (13)

CONCLUSION

The diagnosis of the ARS is difficult to be determined, because it includes many symptoms, which are common with other diseases. The type of the sub-syndromes that could occur depends on the received dose and the type of irradiation. The severity of the ARS depends on the patient condition, dose rate and the type of irradiation. (14) Because of the complex character of that special medical condition, every single case needs optimization and individualisation of the medical treatment. Special medical treatment could be included depending on the health status, age, gender, physiological state, etc. of the irradiated individual.

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Оценка на преглъщането при пациенти с остър инфаркт

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Assessment of swallowing in patients with acute stroke

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РЕЗЮМЕ:

Дисфагията представлява затруднение в преглъщането на течности и/или твърди храни.Дисфагията е често срещан проблем, съпътстващ остър исхемичен мозъчен инсулт- честотата варира в различните проучвания като е около 60% в повечето изследвания, но може да достигне до 100%. В ежедневната практика, особено в обособените центрове за лечение на инсулти, е уместно въвеждането на протокол за изследване и лечение на дисфагията. Целта на тазистатия е да обобщи съществуващата информация за методите на изследване на дисфагията, както и усложненията от нея и подхода за лечение при пациентите с острисхемиченмозъченинсулт.

Ключови думи: исхемиченмозъченинсулт, дисфагия, оценка, скали, хранене

ABSTRACT:

Dysphagia is a difficulty in swallowing liquids and/or solid foods. Dysphagia is a common complication in patients with acute ischemic stroke - the incidence varies in different studies but it is about 60% in most studies, but can be as high as 100%. In everyday practice, especially in the Stroke units, it is appropriate to introduce a protocol for examination and treatment of dysphagia. This article aims to summarize the existing information about the methods of examination of dysphagia, as well as its complications and treatment approach in patients with acute ischemic stroke.

Key words: stroke, dysphagia,assessment, scales, nutrition

INTRODUCTION

Dysphagia („dis" - difficulty and „phagos" - eating) is a symptom of a disorder in the act of swallowing as a result of various reasons. It is difficult to swallow liquids and/or solid foods. It is extremely dramatic and life-threatening condition and in most cases, depending on its severity. It is oropharyngeal when food is difficult to pass from the mouth and pharynx to the esophagus, and esophageal dysphagia when the difficulty in moving food is in the esophagus. Signs of dysphagia may include pain when swallowing (odynophagia), suffocation, prolonged chewing, inability to close the lips, profuse salivation, and leakage of nutrients through the nose.

Any or more than one of these features may strongly suggest the presence of dysphagia. Intact Gag reflex was earlier considered to be suggestive of the absence of dysphagia but this has largely been discarded.

Different structures take part in the swallowing act: numerous muscles of the tongue, jaws, pharynx, larynx, and esophagus. Once the act of swallowing begins, it turns out to be a consistent and synchronized process. The act of swallowing has three phases: oral, pharyngeal, and esophageal. In its oral phase, it is commanded cortically. In the pharyngeal and esophageal phases, regulation is autonomous, from the brain stem through n. vagus and n. glossopharyngeus, and here also cortical volitional intervention is possible. The causes of dysphagia are many, but of particular interest are neurological functional and organic disorders. In particular, the following should be taken into account: cerebellar lesions, cerebral infarcts, diseases of the basal ganglia, damage to the caudal group of cranial nerves (IX, X, XII), such as cranial polyneuropathy and many others.

Dysphagia is a common problem associated with acute ischemic stroke - the frequency varies in different studies and most studies are about 60% and can reach 100%, given the minimal deficit and weakness of the muscles of the tongue. Smith et al. found that within the first three days to a week after acute ischemic stroke clinically in 42% -67% of all patients dysphagia occurs as a complication. (1)

The pathology of dysphagia varies according to the sites of the central nervous system being affected. The cause of dysphagia after stroke is roughly categorized into two mechanisms: pseudobulbar palsy associated with a disturbance of upper motor neurons toward nuclei in the medulla oblongata and bulbar palsy associated with lower motor neurons from nuclei in the medulla oblongata in the brain stem. In patients with pseudobulbar palsy induced by cerebrovascular events in cerebral lesions, symptoms, and signs such as delayed swallowing reflex during the pharyngeal phase of swallowing, reduced laryngeal elevation, and residual food in the vallecula or pyriform sinus are observed. While in patients with bulbar palsy induced by brain stem lesions, loss of swallowing reflex, and insufficient opening of the esophageal orifice are observed. In either case, patients are often complicated by disturbance of consciousness or cognitive disorder, and swallowing is also affected during the anticipatory, preparatory, and oral phases as described below. (1)

DIAGNOSIS

Everyday work with patients with cerebrovascular disorders imposes screening of these patients for dysphagia. Using quick and easy scales and methods for its dynamic assessment is essential for stroke patients.

There are different scales, methods, and studies to determine the origin, grade, and severity of dysphagia. It is determined with different tests, depending on the clinical form of stroke. One of these includes a barium x-ray assessment of muscular activity during the act of swallowing. Another applicable assay is the Dynamic Swallowing study – the patient is given food with different consistency covered in barium. (1) This test shows the impairment of coordination between the oral cavity and the pharyngeal musculature, also whether food is ingested into the airways. Endoscopy can be used to verify the correct anatomy in the area of interest. One particular consideration is the Fiberoptic Endoscopic Evaluation of Swallowing used to assess the oral cavity, pharynx, and the tracheobronchial tree. Esophageal Muscle Test Manometrycan also be used to measure the pressure of the esophageal musculature during the act of swallowing. It also measures the tonic pressure of the muscles in its different parts. Combining all the gathered data allows the characterization of muscle activity and movement during the swallowing. Highly specialized CT and MRI studies are also used in clinical practice to verify dysphagia. One downfall of these methods is the need for a radiology specialist and trained medical personnel.

In many studies, the Gugging Swallowing Screen is used. Its main purpose is to reduce the risk of aspiration during testing, to assess the severity of dysphagia and the risk of aspiration, and to be used for the establishment of individual dietary considerations, depending on the condition.

The GUSS test evaluates dysphagia as well as the risk of aspiration in 4 grades: GUSS 0-9 – severe; 10-14 – mild; 15-19 – minor and GUSS 20 – no impairment. The efficiency of the GUSS test is verified by FEES, which is the practical golden standard. The GUSS test and its stages are presented in table 1.

Many studies have been carried out among stroke patients to assess dysphagia using the GUSS scale. Bassiouny et al include 40 stroke patients within 41 and 77 years of age during the first 2 weeks after clinical manifestation. A GUSS test and after that a FEES was performed. Results show that GUSS has 93,7% sensitivity and 92,5% specificity. This study also shows that dysphagia is observed in 53% of patients with supratentorial lesions and 100% with infratentorial ones. The authors conclude that GUSS is an easy, reliable, and valid test for evaluating dysphagia. Also, it is an appropriate noninvasive method to assess its severity (2).

Another cross-sectional and multicenter study was conducted at 13 hospitals between September 2017 and February 2019. The study included 1163 participants aged ≥65 years and who had no secondary dysphagia. Reliability was evaluated for data quality, scaling assumptions, acceptability, reliability, and validity as well as cutoff points, specificity, and sensitivity. The age distribution of 773 (66.5%) patients was between 65 and 74 years and 347 (29.8%) of them were male and 767 (66%) patients were female. The average total GUSS score was 18.57 ± 1.41. Cronbach's alpha was 0.968. There was a moderate statistically significant negative correlation between the total GUSS and 10-item Eating Assessment Tool scores as well as between the total GUSS score and quality of life. The cutoff point of the total GUSS score was 18.50, sensitivity was 95.5% and specificity was 94.4%. The results of this study conclude that the GUSS test is a valid and reliable test to identify possible oropharyngeal dysphagia risk in healthy older people who had no secondary dysphagia. It is suitable as a screen test for clinical practice (3).

A systematic review of 297 studies that appeared in English and Korean publications up to November 2018 was carried out. 219 articles were reviewed by 2 independent reviewers after duplicate studies were eliminated. Finally, 8 articles were included in this study. Concerning validity, the Gugging Swallowing Screen had a pooled sensitivity of 0.97 (95% confidence interval: 0.93-0.99), a pooled specificity of 0.67 (95% confidence interval: 0.59-0.74), and an area under the receiver operating characteristic curve of 0.9381. About benefit, early systematic dysphagia screening using Gugging Swallowing Screen performed by nurses reduced both screening time and pneumonia rate compared to the control group ($p = 0.004$). The incidence of X-ray-verified pneumonia was significantly lower in the Gugging Swallowing Screen group than in the clinical screening group ($p < 0.01$), but no significant difference was observed in the incidence of pneumonia compared to the value predicted using the 10 mL water swallowing test. (4)

In conclusion, the data from the studies show that GUSS is a fast and reliable method with nearly 100% sensitivity and 69% specificity concerning the risk of aspiration resulting from dysphagia in acute stroke. Its application in practice reveals that there is a much higher risk of aspiration during liquid intake rather than semi-liquid or hard food. To reduce the discomfort of the stroke patients, routine consumption of semi-liquid foods is recommended over the pure liquids. In conclusion, people with GUSS 0-14 have a greater risk of developing aspiration pneumonia over people with GUSS 15-20.

Other not so frequently used scales are DSRS(Dysphagia Severity Rating Scale), DOSS (Dysphagia Outcome and Severity Scale), FDS (Functional Dysphagia Scale), PAS(Penetration-Aspiration Scale). VFSS (Video Fluoroscopic swallowing study) is used to assess the functional impairment using a fluoroscope.

The DSRS is a clinician rated scale that was developed from the dysphagia outcome and severity scale (DOSS). It grades how severe clinical dysphagia is, by quantifying how much modification is required to fluids and diet, as well as level of supervision, for safe oral intake. The DSRS comprises three subscales that are totalled to give a score ranging from

0 (best) to 12 (worst). The subscales are five-level ordinal assessments of fluid and dietary intake and supervision; each ranges from normal (score 0) to no intake (score 4). DSRS is usually used in trials with dysphagicpoststroke patients for assessment the effect of novel treatment with pharyngeal electrical stimulation (PES). The scale is administered during the treatment period and in the follow-up.

GUSS
(Gugging Swallowing Screen)

Name: _____

Date: _____

Time: _____

1. Preliminary Investigation / Indirect swallowing Test

	YES	NO
Vigilance (the patient must be alert for at least 15 minutes)	1 ☐	0 ☐
Cough and/or throat clearing (voluntary cough. Patient should cough or clear his/her throat twice)	1 ☐	0 ☐
Saliva Swallow: • Swallowing successful	1 ☐	0 ☐
• Drooling	0 ☐	1 ☐
• Voice Change (hoarse, gurgled, coated, weak)	0 ☐	1 ☐
SUM:		(5)
	1-4: investigate further 5: continue with part 2	

2. Direct Swallowing Test (Material: Aqua bi, flat teaspoon, food thickener, bread)

In the following order	1→	2→	3→
	SEMISOLID*	LIQUID**	SOLID***
DEGULTITION • Swallowing not possible • Swallowing delayed (>2 sec)(Solid textures >10 sec.) • Swallowing successful	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐	0 ☐ 1 ☐ 2 ☐
COUGH (involuntary): (before, during or until 3 minutes after swallowing) • Yes • No	0 ☐ 1 ☐	0 ☐ 1 ☐	0 ☐ 1 ☐
DROOLING: • Yes • No	0 ☐ 1 ☐	0 ☐ 1 ☐	0 ☐ 1 ☐
VOICE CHANGE: (before and after swallowing, patient			

should speak "O") • Yes • No	0 ☐ 1 ☐	0 ☐ 1 ☐	0 ☐ 1 ☐
SUM:	(5)	(5)	(5)
	1-4: investigate further**** 5: continue with liquid	1-4: investigate further**** 5: continue with solid	1-4: investigate further**** **5: NORMAL**
SUM: (Indirect Swallowing Test AND Direct Swallowing Test) (20)			

***First administer 1/3 up to half a teaspoon Aqua bi with food thickener (pudding like consistency). If there are no symptoms apply 3 to 5 tsp. Assess after 5th spoonful**

****3, 5, 10, 20 ml Aqua bi – if no symptoms – continue with 50 ml (5). Assess and stop the investigation when one of the criteria is observed.**

***** Clinical: dry bread; FEES: dry bread which is dipped in colored fluid**

******Use functional assessment FEES or VFES**

Table 1 GUSS test

COMPLICATIONS DUE TO DYSPHAGIA IN STROKE PATIENTS

The nutrition of patients with severe neurological diseases is a very important task in the therapeutic complex. Impossible or limited intake of food and fluids due to dysphagia leads to the following complications: malnutrition, dehydration in 24%-34% of all patients, disturbance of water-electrolyte and alkaline-acid balance, depletion of energy stores, increases metabolism, failure of immunity and the most severe life-threatening complication of food aspiration and subsequent lung infection, so-called stroke-associated pneumonia (SAP). Stroke associated pneumonia is pneumonia that occurred within 7 days after the onset of stroke.

Of all post-stroke complications, SAP is considered a major one with a strong impact on the stroke outcome. SAP is associated with increased mortality, prolonged time of stay in the hospital, and poor outcome on discharge. Early identification of the probability of SAP is required to improve outcomes of SAP patients. Although various studies on risk factors for SAP were conducted, their results were inconsistent, because of too many scoring systems for the prognosis of the pneumonia risk are existent. Diabetes is a common risk factor for stroke and SAP as well. Hyperglycemia is an independent prognostic factor for bacteria infection and SAP. Patients with consciousness disorders are also at risk due to the increased risk of swallowing disorder, aspiration, reduction in the ability to cough, spit. Glasgow Coma Scale at admission below 8 is an independent prognostic factor of infection and SAP. The above mentioned factors increase the risk of SAP. Patients who had NIHSS > 15 are at the risk of pneumonia. (5) A stroke happens in the cerebral hemisphere, cerebellum, or brain stem can damage swallowing physiology. Cerebral stroke lesions can destroy the voluntary function of mastication and interrupt the bolus transport process of the oral phase. The lesions in the precentral gyrus may cause not only contralateral disorder in facial, tongue, and lip motor function but also a contralateral compromise in the peristalsis of the pharynx. Brain stem stroke may cause sensation loss of the mouth, cheek, and tongue, delay the trigger of the pharynx and glottis. Due to swallowing disor-

ders, foreign objects, food, pathogens easily enter the lower respiratory of pneumonia patients. The study conducted by Bray et al., (2016) with nearly 60,000 stroke patients showed that if the patient were examined for early swallowing disorders to have appropriate preventive measures, the rate of pneumonia after stroke would reduce from 13.8 % to 8%. (6) The patients who had GUSS 0-14 would have a higher risk of pneumonia than patients with GUSS 15-20. (6)

Mechanical ventilation causes a high risk of pneumonia. Hindujaetal.conducted research on 202 primary intracerebral hemorrhage patients: the conclusion is that mechanical ventilation is an independent prognostic factor for infection and SAP. (7) Alsumarain et al. studied 290 stroke patients with cerebral hemorrhage and found that mechanical ventilation increased the risk of pneumonia. (9)

The study by Do Quyet and co-authors with 508patients hospitalized due to stroke within 5 days after the onset of the incident concluded thatSAP was a common complication of stroke. In this study SAP was identified in 13.4%, determinedby some risk factors such as stroke severity (NIHSS> 15), swallowingdisorders (GUSS <15) and mechanical ventilation. (5)

A meta-analysis of 12 studies including 87,824 patientswith acute dysphagia in stroke, analyzed by S. Eltingham and team in Manchester, UK, showed that the use of a screening protocol, early detection, assessmentand management of dysphagia significantly reduce the risk and the chance ofdeveloping SAP. The study describe the influence of other factors that lead topneumonia in the acute phase of the stroke, such as the placement of anasogastric feeding tube. (5)

Aspiration of nutrients, on the one hand, is life-threateningdue to the risk of mechanical airway obstruction, and on the other handaspiration, including saliva, also carries a high risk of developing pneumoniadue to the presence of many microorganisms and bacteria, especially in poorpersonal oral hygiene and poorly sanitized teeth.

TREATMENT OPTIONS

The management of dysphagia are determined by a multidisciplinary team with specific knowledge and experience, and their approach depends on the cause, type, location, and severity of swallowing disorders.

Oropharyngeal dysphagia is treated with the help of a speech therapist, various speech exercises and the application of specific swallowing therapy, a change in diet, and a combination of both methods. Clinical studies show good results in patients who have undergone rehabilitation that strengthens the hyoid muscles and exercises to strengthen the tongue, compared to patients who do not perform such. (10) In practice, Shaker maneuver and CTAR /chin tuck again resistance /, powerful swallowing, breath-holding duringswallowing, supraglottic swallowing, Mendelssohn's maneuver, and head rotationare applied to improve swallowing. Their purpose is to reduce the risk ofaspiration and subsequent pneumonia.

In severe dysphagia, a nasogastric tube (NGT) and / or a percutaneous endoscopically placed gastric tube (PEG) is recommended. Short-term interventions include the insertion of a nasogastric tube (NGT), whilst long-term nutritional support involves the insertion of a percutaneous endoscopic gastrostomy (PEG) tube. NGT is recommended between 24 hours and 48 hours after the onset of the stroke. Saline is required for timely hydration in acute stroke.

Devlos et al. concluded that early enteralnutrition in an acute stroke does not prevent the onset of a negative proteinbalance. In cases a nasogastric tube could not be inserted in a strokepatient due to anatomical abnormalities, it is recommended parenteralnutrition to be included until PEG is administered. While 20% of patients following a stroke may require enteral tube feeding during the acute phase, 8% will require long-term enteral tube feeding for more than six months. The provision of enteral nutrition is not without any risk of potential harm. The insertion of a PEG tube rather than a NGT is associated with less gastrointestinal bleeding and provides a higher delivery of feed. (11)

Oesophageal dysphagia is treated with gastroprotection, botulinum toxin, surgery, and other methods that are used in critically ill patients in need of palliative care. In the case of proven dysphagia and poor personal oral hygiene, the use of Metronidazole gel and the use of prokinetic, antacid, and antiemetic therapy for prophylaxis is recommended. Positioning the patient in the bed below 45 degrees also significantly reduces the risk of aspiration in dysphagia. The most severe complications of dysphagia - aspiration, and pneumonia are treated with antibiotic therapy, at the beginning empirically determined, and later anantibiogram is used to take the right medication. Artificial pulmonary ventilation protecting the airways andcontrolling dysphagia is another option.

The occurrence of dysphagia should be assessed, monitored, and corrected on time in patients with cerebrovascular diseases by diagnosing with the described scales and methods. When the appropriate measures are taken, then the expected complications will be minimized in patients with acute stroke. There are protocols for adequate management in patients with dysphagia including the above mentioned diagnostic and treatment options used in the established Stroke Unit.

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Религиозност при психично здрави християни. Вътрешна консистентност на скалата за религиозно ангажиране

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Religiousness in mentally healthy christian subjects. Internal consistency of the scale for religious engagement

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РЕЗЮМЕ:

Цел: Целта на проучването е да се изследва религиозността при психично здрави християни, като се използва Скалата за религиозна ангажираност и се оцени надеждността (вътрешната консистентност) на скалата. **Метод:** 441 психично здрави лица (222 мъже, 219 жени) от български произход, които изповядват източноправославно християнство, са изследвани за религиозност. **Резултати:** Скалата се състои от 26 айтъма, разделени на 7 подгрупи. Айтъмите корелират помежду си предимно със средни стойности и всички корелации са положителни. Това води до отлична вътрешна консистентност на скалата. Айтъмите с най-малко значение за скалата са Спазването на религиозните празници и Притежанието на Библия. Тези с най-голямо значение във връзка с концепцията за религиозна анга-

ABSTRACT:

Objective: The aim of the study is to investigate religiousness in mentally healthy Christian subjects by using the Scale for Religious Engagement and assess the reliability (internal consistency) of the scale. **Method:** 441 mentally healthy individuals (222 men, 219 women) of Bulgarian origin who profess Eastern Orthodox Christianity were examined for religiousness. **Results:** The scale consists of 26 items divided in 7 subtopics. The correlations between the items are mostly medium and are all positive, which leads to excellent internal consistency of the scale. The items with least importance to the scale are Observance of religious holidays and Possession of Bible, while of greatest significance in relation to the concept of religious engagement are: Belief in Bible's guidance and relevance to our life, Belief in God caring about everything, Importance of religion in

жираност са: Вяра в библейските напътствия и релевантността им за нашия живот; Вяра, че Бог се грижи за всичко; Значение на религията в живота на индивида; Честота на молене; Честота на молене при беда; Молитвата помага при беда. **Изводи:** Разликата между значимите и не толкова важни айтъми ясно показва онези вярвания и служби, които характеризират и са вкоренени у дълбоко религиозните хора.

Ключови думи: религиозност, значение на религията, Скала за религиозна ангажираност, вътрешна консистентност на скала, психично здрави индивиди, християни

the individual's life, Frequency of praying, Frequency of praying when in need, Prayer's helpfulness when in need. **Conclusions:** The distinction between meaningful and less important items clearly shows those beliefs and services that are embedded in and characterize deeply religious people.

Key words: religiousness, importance of religion, Scale for religious engagement, internal consistency of scale, mentally healthy subjects, Christians

INTRODUCTION

Religion is an integral part of most cultures. Religious factors form a core of cultural identities of individuals. Religion and spirituality are a core aspect of coping and self-concept. They relate to social networks and social support systems. Despite that, psychiatry has until recently not paid sufficient attention to the role of religion in mental health (5). But this may be changing. Now there is definite recognition of the link between religion and mental health to the extent that the World Psychiatric Association (14) has implemented policies concerning religion as part of psychiatric training, professional development and clinical practice.

Until this moment significant research evidence has been gathered on the effects of religious beliefs upon health and disease. Koenig et al. (10) have reviewed and discussed research examining the relationships between the patient's religious beliefs and different mental and physical health conditions, based on 400 reviews and 1 200 research studies. The correlations between religious belief and greater well-being „typically equal or exceed correlations between well-being and other psychosocial variables, such as social support (10). At least 80 % of the studies report an association between „religiousness" and greater hope or optimism. 15 out of 16 studies find association between „greater religious involvement" and a greater sense of purpose or meaning; 19 out of 20 studies reported correlations between diverse religious variables and greater social support. 60 (65 %) of 93 studies concerning the relationship between religious involvement and depression find a significant positive correlation between some measures of religious involvement and lower rates of depression. According to the authors there are direct beneficial effects on mental health, such as better cognitive appraisal and coping behaviour in relation to life stresses and negative events. Indirect effects are also to be considered, such as developmental, genetic and biological factors. Koenig et al. (9) find out that better quality studies were more likely to report positive associations between religion and health. In general, at least 2/3 of the studies reviewed demonstrate positive relationships between measures of religiosity and emotional and social well-being and healthier lifestyles.

Religious beliefs and practices have been associated with decreased suicide rates (4), decreased delinquency (1), greater marital stability (2), lower hostility (8), greater hope and optimism (13), higher self-esteem, adaptation to bereavement, greater social support and less loneliness, less anxiety, less psychoses and fewer psychotic tendencies, lower rates of alcohol and drug use and abuse (10). In a study among 474 students in UK the frequency of personal prayer was found to be the most significant factor in a positive relationship between religiosity and psychological well-being (12).

Sociologists and psychologists of religion have for a long time been concerned with the measurement of religiosity, religiousness and religious commitment/involvement/engagement. Religious engagement includes more than one dimension. Someone's acceptance of and stance towards a supernatural being or an ultimate reality involves attitudes, beliefs, emotions, experiences and rituals. Research demonstrates that religiosity is not a unidimensional experience in individuals' lives (16).

Lenski was one of the first to propose a multidimensional model (11). These dimensions included: 1. *„Associational"* aspect: the frequency of religious engagement in worshipping and prayer services; 2. *„Communal"* dimension: the preference and frequency of one's primary-type relations; 3. *„Doctrinal orthodoxy":* the conceptual acceptance of the prescribed church doctrines; 4. *„Devotionalism":* private or personal communion with God through prayers, meditation and religious behaviour.

Later Glock (7) proposed 5 core dimensions of religiosity, that are, according to him, shared by the diverse world religions. 1. *„Ideological dimension":* the religious person is expected to hold and adhere to certain beliefs. 2. *„Ritualistic dimension":* specific religious practices such as prayer – personal or collective, worship and fasting. 3. *„Intellectual dimension":* the religious person should have some knowledge about the basic tenets of faith and the religious scriptures. 4. *„Consequential dimension":* man's relation to man, or religious prescriptions determining the attitudes of the religious followers as a consequence of their religious beliefs.

Verbit (17) proposed the concept of *„components".* He argues that „religion has several „components", and an individual's behaviour in relation to each one has a number of *„dimensions".* He identifies six *„components":* „ritual", „doctrine", „emotion", „knowledge", „ethics" and „community". These are measured along four dimensions: „content", „frequency", „intensity" and „centrality". „Content" refers to the aspects of one's religious repertoire and the „direction" of his/her religious behaviour. „Frequency" concerns the „amount" of engagement of a person in religious behaviours and practices. „Intensity" refers to the degree of determination, strength or consistency in relation to someone's position towards religion. The fourth dimension, 'centrality', measures the importance attributed to religious tenets, rituals, feelings and experiences.

O'Connell (15) proposed two more dimensions in addition to the five dimesions conceptualized by Glock. He argued that „consequential" scale should be divided into two main dimensions - individual and societal consequences – so that the relationships between the dimensions of religiosity are figured out. In the same year Himmelfarb (6) developed an integrated form of a typology of religious engagement and argued that it includes at least two elements: *„doctrinal beliefs"* and *„ritual observance".*

These are just the most widely cited approaches to the measurement of religiosity in support of the view that religious engagement is a multidimensional experience, the variety of which cannot be understood within the framework of unidimensional interpretation of religious beliefs and behaviours. Clayton and Gladden instead (3) argued that religiosity is primarily a commitment to an ideology and the so-called dimensions are simply expressions of the strength of that core commitment.

We should always have in mind that each dimension of a religious engagement may have its sub-dimensions because of the nature of religious experience. Because of that theories and explanatory frameworks for the analysis of religious involvement are vulnerable to omitting some of the dimensions and subdimensions of religiousness. However, they are still a useful means of indentifying general patterns.

MATERIAL AND METHODS

Subjects

The subjects were 441 demographically representative mentally healthy individuals. The sample included only Christians (222 men, 219 women) with a mean age 48.53 years (SD=18.77, range- 16-95) of Bulgarian origin; individuals were excluded if their

parental or grandparental ethnic group was other than Bulgarian. Potential subjects were also excluded if they had an identifiable psychiatric (e.g. schizophrenia, bipolar disorder, major depressive disorder, dementia, etc.) and neurological disorder (e.g., seizure syndrome, multiple sclerosis, etc.).

The study was approved by the local Ethics Committee and written informed consent was obtained from the subjects after the procedure had been fully explained to them.

Assessment of Religious involvement

The subjects were examined with Scale for Religious Engagement. It consists of 26 items divided in 7 subtopics. *First subtopic* - **Religious practice- objective (participation in religious ceremonies, rituals, sacred activities)** includes: *Participation in religious services, Observance of religious holidays, Compliance to religious prescriptions (concerning food, drinks, clothing, music, etc.). Second subtopic - Importance of religion in the individual's life, Belief in God, Belief in the Devil, Belief in afterlife, Belief in Bible (and its contents, incl. wonders), Belief in Bible's guidance and relevance to our life, Belief in God caring about everything. Third subtopic* - **Prayer (prayer or other personal religious and/or worshipping practices)** includes: Frequency of praying, *Frequency of praying when in need (of help, solving a problem, reaching an important decision), Prayer's helpfulness when in need (of help, solving a problem, reaching an important decision). Fourth subtopic* is **Relationship with God (attitudes in regard to the individual relation to God)** and includes only one item - *Personal religious (mystical or transcendent) experiences. Fifth subtopic* - **Sacred scriptures. Religious knowledge** consists of: *Possession of personal Bible, Frequency of Bible reading, Frequency of Bible reading when in need (of help, solving a problem, reaching an important decision), Bible reading's helpfulness when in need (of help, solving a problem, reaching an important decision), Knowledge of one's own religion. Sixth subtopic* - **Social support from the church (use of or influence of church social support) consists of: Participation in** *church/religious community's life, Frequency of seeing/talking to a priest when in need (of help, solving a problem, reaching an important decision), Priest's helpfulness when in need (of help, solving a problem, reaching an important decision). Seventh subtopic* - **Religious background (upbringing, family environment)** consists of: *Religiousness of father, Religiousness of mother, Religious upbringing, Age at beginning of religious engagement.* All items are assessed on Likert-type scale. Some of the items are quantitative measures, others are frequency items as shown on Table 1 and Table 2. The item *Age at beginning of religious engagement* devides subjects into five groups. *Possesssion of personal Bible* has two values - subject owns or does not own Bible. The following three items: *Importance of religion in the individual's life, Religiousness of mother, Religiousness of father* are on Likert-type scale from 0 to 5, as opposed to all other items from 0 to 4. In order to standardize items the score of 5 was united with 4 and stayed as 4.

STATISTICAL ANALYSIS

The data were analyzed with SPSS 24.0 using descriptive statistics, Pearson's correlation coefficient and scale reliability statistics, including Cronbach's alpha. Cronbach's alpha is one of the most commonly used reliability coefficients. Alpha is an estimate of the „internal consistency" of a scale. We assume that the items of a scale are positively correlated with each other because they are measuring, to a certain extent, a common entity. If the items are not positively correlated with each other we have no reason to believe that they are correlated with other possible items we may select. Statistical significance was defined as $p<0.05$ and $p<0.001$.

RESULTS

According to the Scale for Religious Engagement, *Religiousness of mother* has the highest mean score, followed by *Belief in God.* In terms of *Religiousness of mother,* most surveyed induviduals 147 (33.4%) state it was most important for religious involvement, and only 36 (8.2%) state it was irrelevant.

The least of the individuals examined - 407(92.3%) - do not believe in *Bible reading's helpfulness* when in need, 381 (86.4%) do not believe in the Devil, followed by 378 (85.7%) do not believe that talking to a priest helps when in need and is closely followed by *Lack of Belief in Bible 371 (84,1). Belief in afterlife, Bible's guidance and relevance to life, Belief in God caring about everything, Prayer's helpfulness, Knowledge of one's own religion, Religious upbringing in the Family, The importance of religion in life, and Religiousness of the father* are of intermediate significance for religious engagement.

Table 1. ***Scale for Religious engagement, quantitative items.***

Quantitative items in religious scale																									
Belief in God		Belief in the Devil		Belief in afterlife		Belief in Bible		Belief in Bible's guidance		Belief in God caring about everything		Prayer's helpfulness		Knowledge of religion		Bible reading's		Priest's helpfulness		Religious upbringing		Importance of religion		Religiousness of father		Religiousness of mother	
n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
99	22,4	381	86,4	330	74,8	371	84,1	186	42,2	155	35,1	248	56,2	37	8,4	407	92.3	378	85,7	245	55,6	104	23,6	116	26,4	36	8,2
94	21,3	25	5,7	44	10,0	27	6,1	127	28,8	132	29,9	51	11,6	249	56,5	3	0.7	19	4,3	76	17,2	109	24,7	96	21,8	39	8,9
126	28,6	18	4,1	39	8,8	21	4,8	78	17,7	95	21,5	73	16,6	93	21,1	13	2.9	28	6,3	58	13,2	127	28,8	118	26,8	102	23,2
72	16,3	11	2,5	18	4,1	16	3,6	28	6,3	27	6,1	38	8,6	51	11,6	8	1.8	9	2,0	35	7,9	52	11,8	64	14,5	116	26,4
50	11,3	6	1,4	10	2,3	6	1,4	22	5,0	32	7,3	31	7,0	11	2,5	10	2.3	7	1,6	27	6,1	49	11,1	46	10,5	147	33,4
1.73/1.29		.27/.77		.49/.97		.32/.83		1.03/1.14		1.20/1.19		.99/1.30		1.43/.89		.21/.78		.29/.80		.91/1.24		1.62/1.27		1.60/1.30		2.68/1.25	

The observance of religious holidays has the highest mean score - 3.71 and is most commonly practiced by 353 (80.0%) of the persons surveyed. *Participation in religious services* is the second highest mean score of 1.13, with only 25 (5.7%) of those surveyed *participating* very often in *religious services.* Most often, however, 28 (6.3%) of those surveyed *prayed when in need.* Most of the persons surveyed - 405 (91.8%) - had never experienced *mystical or transcendent experiences,* followed by 377 (85.5%) of those who stated that they had never *sought a priest when in need.* Of those surveyed, 25 (5.7%) *participated* very often *in religious services,* 41 (9.3%) *prayed* very often *in general,* and 28 (6.3%) *prayed* very often *in distress. Reading the Bible* very often was generally available in 14 (3.2%) of those surveyed, and very frequent *Bible reading* was reported in 6 (1.4%). *Participation in church life* is very common in 22 (5.0%) of the respondents.

In terms of the variable *possession of personal Bible,* 161 (45.3%) of those surveyed own a Bible and 191 (54.7%) do not own a Bible.

The *age of religious engagement* is divided into: childhood (<10), adolescent (11-20), youth (21-30), adult (> 30) and I am not involved. The frequencies by age are childish - 91 (20.6%), adolescent - 24 (5.4%), youth - 17 (3.9%), mature - 48 (10.9%) and I am not involved - 261 (59.2%).

Correlations between the variables on the scale were analyzed with Pearson's Correlation coeficient. Most of the variables show medium correlations (0.30> r <0.60). Almost all correlations are statistically significant at p <0.001, with only some being significant at p <0.05. All correlations are positive. The highest correlation is found in *Bible reading when in need* and *Bible's helpfulness when in need* (r = .96). The correlation between

Table 2. ***Scale for Religious engagement, frequency items.***

Frequency items in religious scale																				
	Participation in religious services		Observance of religious holidays		Compliance to religious prescriptions		Frequency of praying		Prayer's helpfulness		Mystical, transcendent experiences		Bible reading		Bible reading when in need		Participation in church life		Talking to a priest	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
0	172	39,0	5	1,1	354	80,3	252	57,1	244	55,3	405	91,8	299	67,8	407	92,3	281	63,7	377	85,5
1	131	29,7	3	0,7	16	3,6	77	17,5	83	18,8	18	4,1	44	10,0	10	2,3	49	11,1	29	6,6
2	70	15,9	18	4,1	23	5,2	46	10,4	58	13,2	15	3,4	59	13,4	14	3,2	53	12,0	18	4,1
3	43	9,8	62	14,1	23	5,2	25	5,7	28	6,3	1	0,2	25	5,7	4	0,9	36	8,2	9	2,0
4	25	5,7	353	80,0	25	5,7	41	9,3	28	6,3	2	0,5	14	3,2	6	1,4	22	5,0	8	1,8
M/SD	1.13/1.20		3.71/0.68		.52/1.16		.92/1.32		.90/1.32		.13/.50		.66/1.10		.17/0.65		.80/1.22		.28/.79	

Seeing/Talking to a priest when in need and *Seeing/Talking to a priest's helpfuness when in need,* as well as the correlation between *Importance of Religion and Belief in God* are the second largest (r = .94). The smallest correlation was found between *Observance of religious holidays* and *Possession of a Bible, Reading the Bible in need of help, Bible's helpfulness when in distress* (r = .05; .09; .09). These correlations do not reach clinical significance. A weak correlation, however reaching clinical significance at p <0.05 is between *Observance of religious holidays and Bible reading, Belief in Bible,* and *Mystical, ecstatic, transcendent experiences and Belief in the Devil* (r = .10; .11; .11) . The weakest correlative relationship, however, reaching clinical significance at p <0.001 again relate to Observance of religious holidays and Belief in the devil, Knowledge of religion, and Seeing/Talking to a priest when needed (r = .13; .15; .15 respectively).

Cronbach's alpha coefficient determined the internal consistency of a scale and depended on the correlations and number of items of the scale. 26 items were analyzed for reliability. As a whole, the medium and high correlations in addition to lack of negative correlations between the variables of the Religious Engagement Scale tested in Christian subjects determined its excellent Cronbach's alpha= ,963. Cronbach's alpha based on Standardized Items virtually has the same value- ,964, due to above mentioned reasons. Deleting any of the items will not improve the internal consistency of the scale. If we look at the Corrected Item-Total Correlation, *Observance of religious holidays* has the lowest correlation with the total score. Deleting this item will lower the scale mean most compared to all other items. The next item with lower Corrected Item-Total Correlation is *Possession of personal Bible.* But deleting this item will not change Scale mean, may be due to its binary coding. *Possession of personal Bible* was questioned in 357 subjects. In case this item is excluded then the population for Cronbach's alpha coefficient analyze will increase to 440. In that way alpha will decrease to ,962 and Cronbach's alpha based on Standardized Items will decrease to ,963. Due to excellent internal consistency of the scale there is no need to remove certain items.

Table 3. ***Correlation matrix of the 26 variables from the Scale for religious engagement***

	Participation in religious services	Observance of religious holidays	Compl. to religious prescriptions	Belief in God	Belief in the Devil	Belief in afterlife	Belief in Bible	Belief in Bible's guidance	God caring about everything	Frequency of praying	Frequency of praying in need	Prayer's helpfulness in need	Mystical, transcendent experiences	Possession of Bible	Frequency of Bible reading	Frequency of Bible reading in need	Bible's helpfulness in need	Knowledge of religion	Participation in church's life	Talking to a priest in need	Priest's helpfulness in need	Religious upbringing	Age at religious engagement	Importance of religion	Religiousness of father	Religiousness of mother
Observance of religious holidays	,34**																									
Compl. to religious prescriptions	,68**	,18**																								
Belief in God	,77**	,40**	,61**																							
Belief in the Devil	,51**	,13**	,63**	,52**																						
Belief in afterlife	,59**	,16**	,62**	,60**	,79**																					
Belief in Bible	,52**	,11*	,60**	,55**	,90**	,79**																				
Belief in Bible's guidance	,77**	,31**	,66**	,82**	,65**	,64**	,67**																			
God caring about everything	,78**	,35**	,65**	,86**	,63**	,64**	,64**	,91**																		
Frequency of praying	,77**	,27**	,70**	,77**	,57**	,63**	,58**	,77**	,77**																	
Frequency of praying in need	,74**	,26**	,65**	,77**	,57**	,62**	,61**	,77**	,77**	,88**																
Prayer's helpfulness in need	,74**	,28**	,67**	,76**	,57**	,63**	,58**	,78**	,78**	,85**	**,93****															
Mystical, transcendent experiences	,49**	,11*	,54**	,44**	,64**	,55**	,63**	,52**	,50**	,56**	,57**	,54**														
Possession of Bible	,22**	,05	,23**	,25**	,20**	,24**	,20**	,27**	,26**	,28**	,28**	,29**	,12*													
Frequency of Bible reading	,42**	,10*	,39**	,43**	,41**	,45**	,42**	,48**	,47**	,47**	,50**	,48**	,34**	,59**												
Frequency of Bible reading in need	,40**	,09	,41**	,35**	,49**	,47**	,51**	,43**	,43**	,45**	,47**	,44**	,54**	,27**	,60**											
Bible's helpfulness in need	,42**	,09	,41**	,36**	,49**	,48**	,51**	,44**	,44**	,46**	,46**	,46**	,51**	,29**	,62**	,96**										
Knowledge of religion	,38**	,15**	,30**	,41**	,29**	,34**	,30**	,37**	,37**	,39**	,40**	,38**	,27**	,47**	,73**	,48**	,47**									
Participation in church's life	,62**	,19**	,49**	,59**	,46**	,48**	,49**	,62**	,58**	,61**	,57**	,57**	,43**	,30**	,49**	,44**	,46**	,46**								
Talking to a priest in need	,59**	,15**	,60**	,50**	,60**	,57**	,61**	,61**	,60**	,60**	,58**	,56**	,53**	,33**	,59**	,66**	,66**	,46**	,69**							
Priest's helpfulness in need	,59**	,16**	,64**	,51**	,63**	,59**	,61**	,64**	,61**	,62**	,60**	,60**	,54**	,34**	,59**	,64**	,66**	,44**	,67**	,94**						
Religious upbringing	,69**	,26**	,58**	,68**	,45**	,51**	,46**	,71**	,71**	,71**	,66**	,70**	,49**	,22**	,34**	,32**	,32**	,23**	,60**	,56**	,56**					
Age at religious engagement	,68**	,30**	,53**	,67**	,38**	,42**	,37**	,67**	,68**	,67**	,66**	,70**	,40**	,23**	,32**	,28**	,28**	,23**	,55**	,46**	,45**	,80**				
Importance of religion	,81**	,41**	,64**	,94**	,52**	,59**	,54**	,84**	,87**	,80**	,78**	,78**	,47**	,24**	,44**	,37**	,38**	,41**	,60**	,55**	,56**	,72**	,73**			
Religiousness of father	,42**	,19**	,39**	,51**	,29**	,32**	,31**	,44**	,45**	,46**	,41**	,41**	,31**	,12*	,19**	,20**	,22**	,14**	,43**	,34**	,32**	,55**	,47**	,51**		
Religiousness of mother	,45**	,17**	,33**	,51**	,25**	,27**	,26**	,47**	,49**	,45**	,42**	,41**	,25**	,20**	,22**	,17**	,18**	,12*	,39**	,32**	,33**	,56**	,48**	,52**	,59**	

Table 4. ***Variables of the Scale for religious engagement and their relationships to the whole scale (variable-scale statistics).***

	Item-Total Statistics		
Religious engagement scale	Scale Mean if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
Participation in religious services	24,60	,839	,961
Observance of religious holidays	21,98	,293	,964
Compliance to religious prescriptions	25,18	,759	,961
Belief in God	24,10	,868	,960
Belief in the Devil	25,50	,681	,962
Belief in afterlife	25,29	,740	,962
Belief in Bible	25,50	,702	,962
Belief in Bible's guidance to our life	24,75	,893	,960
Belief in God caring about everything	24,56	,884	,960
Frequency of praying	24,82	,874	,960
Frequency of praying when in need	24,89	,875	,960
Prayer's helpfulness when in need	24,76	,865	,960
Mystical, transcendent experiences	25,63	,598	,963
Possession of personal Bible	25,31	,345	,964
Frequency of Bible reading	25,11	,612	,963
Frequency of Bible reading when in need	25,60	,579	,963
Bible reading's helpfulness when in need	25,56	,584	,963
Knowledge of one's own religion	24,36	,507	,963
Participation in church's life	25,03	,766	,961
Talking to a priest when in need	25,48	,753	,962
Priest's helpfulness when in need	25,45	,758	,962
Religious upbringing	24,76	,783	,961
Age at beginning of religious engagement	24,46	,719	,963
Importance of religion in the individual's life	24,15	,880	,960
Religiousness of father	24,15	,521	,964
Religiousness of mother	23,06	,516	,964

Table 5. ***Summary statistics for the items of the Scale for Religious Engagement in mentally healthy individuals.***

	Mean	Minimum	Maximum	Range	Maximum / Minimum
Item Means	,991	,134	3,784	3,650	28,146
Item Variances	1,178	,249	2,830	2,581	11,384
Inter-Item Correlations	,508	,047	,966	,920	20,684

The summary statistics of the Scale for Religious Engagement applied in mentally healthy subjects (Table 5) showed considerable differences in the contribution of the individual variables. The mean values of some variables were 28 times greater than those of other variables, which suggested greater religious commitment and consequently greater contribution of these variables to the total score. The mean correlation between the Scale for Religious Engagement variables is high (.508), which indicated excellent internal consistency of the scale.

DISCUSSION

Religion involves affiliation and identification with a religious group, cognitive factors – beliefs, and emotional and experiential factors. The Scale for Religious Engagement questions about core religious commitment pillars and other aspects that expand to the practices and influence religiousness. We have hypothesized that *Observance of religious holidays* has the least correlation with other items in relation to social-psychological influences: conforming to the usual annual times of celebrating community, continuity and family warmth, faith that God is benign and supportive or avoiding believes that God is punishing, vengeful or simply indifferent. The gratification obtained does not lead to further activities that correspond to core religiousness. *Possession of Bible* also correlates poorly with other items. Probable explanations include moral and philosophical quests in adults who would more probably define themselves (or be defined by others) as spiritual but not religious. Another options are sentiments for past traditions (or inheritance), for emotional relief, probable expectations for support from God and obsessiveness for observance of canons. *The religiousness of parents* is logically expected to be transferred to posterity. But observing in some cases religious mother and father and lack of religiosity or even anti-religiosity in the generation is not illogical, and may be due to psychological resistance against parents, environmental influences opposite to those of the family, conformism to the views of younger generations, liberalism and progressiveness against traditionalism/conservatism, etc.). *Knowledge of one's own religion* similar to Bible possession is not inevitably related to religious engagement. This knowledge may promote positive mood states, purpose in life, may foster joy, optimism and forgiveness or may simply be an intellectual (conceptual) or obsessive need in some individuals. On the contrary in not so differentiated (lower education, social and professional status) individuals lack of knowledge does not cease or influence the frequency and intensity of religious rites, prayers and devotion.

CONCLUSION

The following items from the Scale for Religious Engagement have been found to have the greatest significance in relation to the concept of religious engagement: *Belief in Bible's guidance and relevance to our life, Belief in God caring about everything, Importance of religion in the individual's life, Frequency of praying, Frequency of praying when in need (of help, solving a problem, reaching an important decision), Prayer's helpfulness when in need (of help, solving a problem, reaching an important decision).* We consider these items as probably representing the most characteristic aspects of deeply religious and religiously engaged individuals: those,

who truly believe in God's care spreading over everything and in the guidance and relevance of the holy scriptures about all aspects of life and everyday issues, who pray often, whose prayers help them in moments of need and who have persistent strong convictions that they can count on God and personal connection with God through prayer in difficult times. It is very probable that exactly these characteristics help them cope with hardships, adversities, stresses and negative events and thus contribute to their resilience and greater psychological, emotional and social well-being. Future research using different measures of religious engagement may add more understanding about these issues.

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Лингвистична и кроскултурална адаптация на Скалата за депресия на Детлев фон Церсен върху извадка от онкологични пациенти с депресивна симптоматика

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Linguistic and cross-cultural adaptation of the Detlev Von Zerssen Depression Scale in a sample of oncological patients

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РЕЗЮМЕ:

След приключването на лингвистичния превод, съобразен с културните особености на българската популация и диференцирането им спрямо оригиналната популация в Германия, се пристъпва към пилотно приложение на инструмента с цел проверка на неговите психометрични характеристики. В контролната и в клиничната група изследваните лица са равномерно разпределени по пол и възраст. И в двете групи са включени изследвани лица на възраст от 20 до 60 г., за да се представи кохорта, за която са налични предварително ясни статистически норми. Контролната група се състои от пациенти с онкологична диагноза и предварително установена депресивна симптоматика. Предварителната диференциация на депресивни прояви се установява чрез инструмента „Термометър на дистреса", който се прилага като стандарт в психо-онкологичната практика. Всички изследвани лица в клиничната популация са на активно лечение, за да се избегне контаминиране на резултатите от твърде разнообразната психична динамика у пациенти, които са в ремисия

ABSTRACT:

After completing a linguistic translation, in concordance with the cultural characteristics of the Bulgarian population and their differentiation from the original population in Germany, follows a pilot implementation of the instrument in order to test its psychometric properties. In both the control group and the experimental group, all test subjects are equally distributed by gender and age. In both groups the participants range between 20 and 60 years of age, so that a cohort is constructed for which predetermined clear statistical norms are available. The control group consists of patients with an oncological diagnosis and ongoing depressive symptoms. These symptoms were assessed by using the Distress Thermometer, a widely used instrument in psycho-oncological practice. The administered procedures allow the identification of the statistical norms for the psychometric properties of the Scale in a Bulgarian population and indicate the fields which require further investigation. The study marks two main conclusions. Firstly, the levels of depression in the Bulgarian control group, though demonstrating sufficient consistency, are rel-

или на друг вид терапия. Проведените процедури позволяват да се идентифицират статистическите норми за психометричните качества на представената Скала за българската популация и посочват онези полета, в които е необходимо да се извърши повече изследователска дейност. Изследването позволява да се направят два основни извода: първо, на фона на добра вътрешна консистентност на резултатите, нивата на депресивност в контролната извадка в България са относително по-високи в сравнение със същите конструкти, измерени в Германия. Второ, адаптираният инструмент е чувствителен при измерване на депресивна симптоматика и това проличава ясно в резултатите от клиничната извадка.

Ключови думи: лингвистична и кроскултурна адаптация, психометрия, фон Церсен, психо-онкология, скала за депресия.

atively high, compared to their respective levels within the German population. Secondly, the instrument adapted is sensitive to measuring of depressive symptoms, which is evident in the results of the experimental group.

Key words: cross-cultural adaptation, psychometrics, von Zerssen, psycho-oncology, depression scale.

1. Organization of the empirical research

For the purpose of the pilot testing two parallel studies were conducted. The first was the administering of the test to a clinically healthy population, comprising the control group. The gender and age distribution is relatively even, with the lowest age being 20 years and the highest being 60. These limitations were necessary because of the lack of consistent information for the excluded age groups.

The second group is the clinical extract. It consists of oncological patients. Consistency with the first group in terms of age and gender was aimed. The studies on the clinical extract were conducted in a department of medical oncology.

1.1 Test Subjects

1.1.1 Control group

The control group consists of 32 test subjects. Of them 15 are men and 17 are women. The requirements for the test subjects are: absence of a psychiatric disease and Bulgarian as a native language. The studies were conducted at the end of 2016.

1.1.2 Clinical Sample

The clinical sample consists of 33 test subjects. Of them 14 are men and 19 are women. The requirements for the test subjects are: a present oncological diagnosis, active treatment, Bulgarian as a native language, and clinically demonstrated distress. The distress is determined using the self-assessment scale DT – Distress Thermometer, in which patients are instructed to assess numerically the degree of their psychological distress at the moment from 0 to 10 (0 being the absence of a symptom).

The reason why the clinical extract has to be limited to patients on active treatment (as opposed to those coming for control examinations) lies in the different psychological experiences demonstrated by patients in remission. The successful ending of an oncological treatment not always means overcoming of the associated psychological disorders, but it allows more time for stress management and thus changes the consistency of the population.

The requirement for patients to have self-assessed the experienced distress as more substantial (bigger or equal to 4 in the DT) comes from the necessity for isolation of an

extract of test subjects, who have an insight into their negative inner psychological experiences. A sizable part of the oncological patients deny or do not recognize associated psychological symptoms. The studies were conducted at the end of 2016 and the beginning of 2017.

For a subsequent data analysis these have to be taken into account: (1) the individual course of treatment of each patient, (2) the severity of the psychological distress during the active treatment, (3) the differences stemming from the different diagnoses.

1.2 Procedure

The test subjects in both extracts are asked to participate in a study for the standardization of a new psychometric instrument for the Bulgarian population. Should they accept, they are given two item forms for scales DT and DT'. They are asked to read the instructions carefully and they are also told that the study guarantees their anonimity and no information about them will be used for any non-scientific purpose.

The procedure of standardization contains the conducting of a re-test no later than seven days after the initial administering of the test. This was closely followed with the test subjects from the control group. When it comes to the test subjects of the clinical extract, there is a variation in the period between the test and the retest, which is due to the limitations based on their hospital stay. In any case, the retest was never done later than the ninth or earlier than the fifth day after the initial testing. Patients in the clinical extract fill out the survey in a controlled environment in the hospital.

During the examination a small number of invalid answer forms were submitted (mostly in the control group) which were taken away from the present work. The reason for their invalidity in all cases had to do with technical mistakes by the test subjects and their lack of attention.

2. Tabular presentation and data analysis

2.1 Control group

Test subjects All: 32. Men: 15, Women: 17. R marks retests.

2.1.1 DS MEN

Raw Score	Percentile	Standard T-score	Normal Distribution
3	10,00	38,39	1
3	10,00	38,39	1
4	23,33	41,11	2
4	23,33	41,11	2
5	36,67	43,83	4
5	36,67	43,83	4
6	50,00	46,55	5
6	50,00	46,55	5
7	60,00	49,27	6
8	66,67	52,00	6
9	73,33	54,72	7
10	80,00	57,44	7
11	86,67	60,16	8
13	93,33	65,61	8
15	100,00	71,05	9

The results from the table above are compared to the respective normative data from the studies conducted on German population. 7.4% of the surveyed men in Germany had a score of 0 points, while the men in the Bulgarian population didn't have such a score. The top score in Bulgaria was 15 out of 48, which shows that in the tested cohort there were no symptoms for clinical depression. The top score in the German extract is 34 (0.1% of all test subjects), while in the Bulgarian extract it is 15 (6.67%). These data show good consistency of the test results.

2.1.2 DS WOMEN

Raw Score	Percentile	Standard T-score	Normal Distribution
3	8,82	58,67	1
3	8,82	58,67	1
4	20,59	58,97	2
4	20,59	58,97	2
5	29,41	59,26	3
6	41,18	59,55	4
6	41,18	59,55	4
6	41,18	59,55	4
7	55,88	59,84	5
7	55,88	59,84	5
8	64,71	60,14	6
10	73,53	60,72	7
10	73,53	60,72	7
11	82,35	61,02	8
12	91,18	61,31	8
12	91,18	61,31	8
14	100,00	61,90	9

Similar to the table above, where the scores of the men from the normative extract were presented, the women's lowest score is 3. In the German extract the lowest score is 0 (4.9% of test subjects). The top score in the Bulgarian female extract is 14 (8.82%), in the German it is 36 (0.1%). The comparison between the normal distributions of the men and women in the Bulgarian population doesn't show any significant differences. The test scores show a lack of clinical depression symptoms in the tested women from the control group.

2.1.3 DS' MEN

Raw Score	Percentile	Standard T-score	Normal Distribution
4	16,67	59,11	2
4	16,67	59,11	2
4	16,67	59,11	2
4	16,67	59,11	2
5	36,67	59,33	4
5	36,67	59,33	4
6	53,33	59,55	5
6	53,33	59,55	5
6	53,33	59,55	5
7	66,67	59,78	6
11	73,33	60,67	7
12	80,00	60,89	7
15	90,00	61,56	8
15	90,00	61,56	8
16	100,00	61,78	9

The lowest score from the DS' test on men from the normative extract is 4, while in the German population it is again 0 (6.9%). The top score in the Bulgarian extract is 16, while in the first scale it was 15. 10% of the tested men had a score of 16. In the German extract DS' again shows higher scores – 38 points for men (0.1%). The data from the Bulgarian extract are below the clinically significant scores for identification of depressive symptoms.

2.1.4 DS' WOMEN

Raw Score	Percentile	Standard T-score	Normal Distribution
1	5,88	58,06	1
3	11,76	58,69	2
4	20,59	59,00	2
4	20,59	59,00	2
6	35,29	59,63	4
6	35,29	59,63	4
6	35,29	59,63	4
7	52,94	59,94	5
7	52,94	59,94	5
7	52,94	59,94	5
8	67,65	60,26	6
8	67,65	60,26	6
9	76,47	60,57	7
10	82,35	60,89	8
12	94,12	61,51	9
12	94,12	61,51	9
12	94,12	61,51	9

The DS' tested women show a decline in the top scores, in Bulgaria being 12 and in Germany being 36 (0.1%). The lowest score in Bulgaria is 1 point and in Germany – 0. Percentage-wise the lowest scores are close – 5.88% in Bulgaria and 4.1% in Germany. The results are not showing any clinical depression symptoms.

2.1.5 DS-R MEN

Raw Score	Percentile	Standard T-score	Normal Distribution
1	6,67	58,70	1
2	20,00	58,98	2
2	20,00	58,98	2
2	20,00	58,98	2
3	33,33	59,25	3
4	40,00	59,53	4
5	50,00	59,80	5
5	50,00	59,80	5
6	60,00	60,07	6
7	70,00	60,35	6
7	70,00	60,35	6
8	80,00	60,62	7
9	86,67	60,89	8
12	93,33	61,71	8
13	100,00	61,99	9

In the table above the scores of the tested men after the retest in the control group are provided. The lowest score is 1 point, while during the initial testing it was 3 points. The top score is 13 points, while during the initial testing it was 15. It can be concluded that we have lower raw scores on the retest. There is no data signaling clear depressive symptoms.

2.1.6 DS-R WOMEN

Raw Score	Percentile	Standard T-score	Normal Distribution
3	14,71	58,89	2
3	14,71	58,89	2
3	14,71	58,89	2
3	14,71	58,89	2
5	35,29	59,36	4
5	35,29	59,36	4
5	35,29	59,36	4
6	47,06	59,60	5
7	55,88	59,83	5
7	55,88	59,83	5
8	64,71	60,07	6
9	70,59	60,30	7
12	79,41	61,01	7
12	79,41	61,01	7
13	88,24	61,24	8
14	94,12	61,48	9
16	100,00	61,95	9

The women show the same lowest scores on the initial testing and on the retest. The second time, though, the percentage of score 3 has increased (from 8.82% yo 14/71%). The top retest score is 16 – 2 points higher than the top score on the initial testing. Close to 6% of the retested women have the top score but they are not enough for the identification of depression symptoms.

2.1.7 DS'-R MEN

Raw Score	Percentile	Standard T-score	Normal Distribution
3	13,33	58,78	2
3	13,33	58,78	2
3	13,33	58,78	2
4	26,67	59,04	3
5	33,33	59,30	3
6	40,00	59,55	4
7	50,00	59,81	5
7	50,00	59,81	5
8	60,00	60,07	6
9	66,67	60,33	6
10	76,67	60,58	7
10	76,67	60,58	7
13	86,67	61,36	8
14	96,67	61,61	9
14	96,67	61,61	9

On the DS' second administration men are showing a decrease by 1 point in the lowest scores. While on the initial testing 4 subjects share the lowest score (4 points), on the retest 3 subjects have 3 points, which is the lowest score here. There is a slight decrease by 1 point in the top scores as well. The top score is 14 (reached by 2 subjects) and in the initial testing it was 16. At the same time the percentage of top scorers remains the same – 10%.

2.1.8 DS'-R WOMEN

Raw Score	Percentile	Standard T-score	Normal Distribution
0	6	58,06	1
2	12	58,55	2
3	18	58,80	2
5	24	59,29	3
6	35	59,54	4
6	35	59,54	4
6	35	59,54	4
7	47	59,78	5
9	59	60,28	6
9	59	60,28	6
9	59	60,28	6
10	74	60,52	7
10	74	60,52	7
12	85	61,01	8
12	85	61,01	8
13	94	61,26	9
15	100	61,75	9

On both the test and the retest, the DS' women from the control group show the lowest scores in the whole study. The first time it was a score of 1 point and in the retest there is a score of 0 which means complete absence of depression symptoms. 6% of the test subjects have this score, while in the German population it is 4.1%. The top score is 15 points and on the initial testing it was 12. The comparison between the normal distributions and the T-values has not shown any notable differences between the two genders. There are no data for depression symptoms.

2.1.9 Retest DS-DS-R

Correlations			
		DS	DS-R
DS	Pearson Correlation	1	,879**
	Sig. (2-tailed)		,000
	N	32	32
DS-R	Pearson Correlation	,879**	1
	Sig. (2-tailed)	,000	
	N	32	32

**. Correlation is significant at the 0.01 level (2-tailed).

The table above shows the correlation analysis, expressed in the Pearson coefficient, of the test-retest procedure of the DS. The result of 0.879 signifies high correlation and shows the congruence between the scores on the test and on the retest.

2.1.10 Retest DS'-DS'-R

Correlations			
		DS'	DS'-R
DS'	Pearson Correlation	1	,832**
	Sig. (2-tailed)		,000
	N	32	32
DS'-R	Pearson Correlation	,832**	1
	Sig. (2-tailed)	,000	
	N	32	32

**. Correlation is significant at the 0.01 level (2-tailed).

The results of the correlation analysis for the test-retest of DS' are lower than those for the DS. Nevertheless, the Pearson coefficient is 0.832 which signifies high correlation.

2.2 Clinical extract

Test Subjects
All: 33, Men:14, Women:19
-R marks the retests.

2.2.1 DS MEN

Raw Score	Percentile	Standard T-score	Normal Distribution
4	7,14	35,33	1
6	14,29	36,89	2
11	21,43	40,78	2
13	28,57	42,33	3
16	35,71	44,67	4
20	42,86	47,78	4
21	50,00	48,56	5
22	57,14	49,33	5
24	64,29	50,89	6
27	71,43	53,22	7
32	78,57	57,11	7
35	85,71	59,45	8
41	92,86	64,12	8
48	100,00	69,56	9

The results acquired from the tested men in the clinical extract demonstrate a variety within the raw scores. The lowest score measured is 4, which is just 1% higher than the lowest score in the control group. At the same time in the table above is observed the highest possible score in the scale – 48 points. While in the normative extract the top score is 15 points, the scores above demonstrate the predominant manifestation of higher scores. These results strongly signify highly expressed depression symptoms in the extract.

2.2.2 DS WOMEN

Raw Score	Percentile	Standard T-score	Normal Distribution
10,00	5,26	32,22	1
16,00	10,53	38,35	1
17,00	15,79	39,37	2
18,00	21,05	40,39	2
20,00	26,32	42,43	3
21,00	31,58	43,45	3
23,00	39,47	45,49	4
23,00	39,47	45,49	4
24,00	47,37	46,51	5
25,00	52,63	47,53	5
26,00	57,89	48,55	5
32,00	65,79	54,67	6
32,00	65,79	54,67	6
35,00	73,68	57,73	7
36,00	81,58	58,75	7
36,00	81,58	58,75	7
38,00	89,47	60,80	8
44,00	94,74	66,92	9
45,00	100,00	67,94	9

The difference between the top scores of the women in the control group and those in the clinical extract is substantial. The lowest score in the control group is 3 points and in the clinical extract it is 10 points. With the exception of one test subject, all test subjects in the clinical extract have higher scores than the women in the control group. The top score here is 45 points and it was 14 for the healthy subjects. The results show higher levels of depression symptoms in the tested extract.

2.2.3 DS' MEN

Raw Score	Percentile	Standard T-score	Normal Distribution
9,00	7,14	33,20	1
11,00	14,29	34,98	2
12,00	21,43	35,87	2
20,00	28,57	42,96	3
26,00	35,71	48,29	4
28,00	42,86	50,06	4
31,00	53,57	52,73	5
31,00	53,57	52,73	5
32,00	64,29	53,61	6
33,00	71,43	54,50	7
35,00	78,57	56,28	7
36,00	85,71	57,16	8
40,00	92,86	60,71	8
47,00	100,00	66,92	9

The results presented show expectedly higher scores in the clinical extract. The lowest score is 9 points (4 in the control group), and the highest score is 47 points (16 in the control group). The data are demonstrating high levels of depression symptoms. In the application of the DS' test higher scores are registered once again, in comparison to the DS ones.

2.2.4 DS' WOMEN

Raw Score	Percentile	Standard T-score	Normal Distribution
18	5,26	31,93	1
22	10,53	36,80	1
24	15,79	39,24	2
25	23,68	40,45	3
25	23,68	40,45	3
26	31,58	41,67	3
27	36,84	42,89	4
32	42,11	48,97	4
33	52,63	50,19	5
33	52,63	50,19	5
33	52,63	50,19	5
37	65,79	55,06	6
37	65,79	55,06	6
38	73,68	56,28	7
40	81,58	58,71	7
40	81,58	58,71	7
42	89,47	61,15	8
46	97,37	66,02	9
46	97,37	66,02	9

Within the above shown results, high levels of depression symptoms are witnessed. Compared to the scores by the same subjects on DS, higher scores on DS' are observed to have been reached. The lowest score is 18 points and it is 6 points higher than the topmost score of the control group (12 points).

2.2.5 DS-R MEN

Raw Score	Percentile	Standard T-score	Normal Distribution
3	7,14	35,48	1
8	14,29	39,51	2
10	21,43	41,13	2
12	28,57	42,74	3
15	35,71	45,16	4
16	46,43	45,97	4
16	46,43	45,97	4
18	57,14	47,58	5
24	67,86	52,42	6
24	67,86	52,42	6
32	78,57	58,87	7
33	85,71	59,68	8
35	92,86	61,29	8
48	100,00	71,78	9

The results from the DS retest on a population of oncological male patients demonstrate a similarity in the data received. On the second administering, the lowest score is 3, which is one point lower than the maximum score on the initial testing. The topmost scores in both cases are the same. There is observable consistency within the recorder results.

2.2.6 DS-R WOMEN

Raw Score	Percentile	Standard T-score	Normal Distribution
2,00	5,26	32,69	1
6,00	10,53	36,35	1
7,00	15,79	37,26	2
12,00	21,05	41,83	2
13,00	26,32	42,74	3
16,00	31,58	45,48	3
17,00	39,47	46,39	4
17,00	39,47	46,39	4
18,00	47,37	47,31	5
19,00	52,63	48,22	5
20,00	57,89	49,13	5
22,00	63,16	50,96	6
24,00	68,42	52,79	6
28,00	73,68	56,44	7
30,00	78,95	58,27	7
33,00	84,21	61,01	8
36,00	89,47	63,75	8
38,00	94,74	65,58	9
40,00	100,00	67,40	9

The significantly high scores from the initial administration of the instrument on the same subjects are not matched by the retest. The scores are still high, but while on the initial testing the lowest score was 10, here, on the retest, we have scores of 2, 6 and 7 points. The top score is 40 and it was 45 on the initial testing. Despite the slight decrease, the test subjects are again demonstrating high levels of depression symptoms.

2.2.7 DS'-R MEN

Raw Score	Percentile	Standard T-score	Normal Distribution
10	10,71	36,15	1
10	10,71	36,15	1
14	21,43	39,99	2
19	28,57	44,79	3
20	35,71	45,75	4
22	46,43	47,67	4
22	46,43	47,67	4
25	60,71	50,55	6
25	60,71	50,55	6
29	75,00	54,39	7
29	75,00	54,39	7
30	85,71	55,35	8
40	92,86	64,94	8
47	100,00	71,66	9

The scores from the DS' retest demonstrate a higher number of lower scores compared to the initial testing. At the same time, the lowest score on the retest is 10 and it is one point higher than the lowest score on the initial testing. The two top scores remain the same.

2.2.8 DS'-R WOMEN

Raw Score	Percentile	Standard T-score	Normal Distribution
9	5,26	33,82	1
10	10,53	34,87	1
13	15,79	38,03	2
14	21,05	39,09	2
16	26,32	41,19	3
20	31,58	45,40	3
21	36,84	46,45	4
22	42,11	47,51	4
23	50,00	48,56	5
23	50,00	48,56	5
26	60,53	51,72	6
26	60,53	51,72	6
28	68,42	53,82	6
31	73,68	56,98	7
32	81,58	58,03	7
32	81,58	58,03	7
37	89,47	63,30	8
38	94,74	64,35	9
42	100,00	68,56	9

As with the men, the women also have a higher number of lower scores on the retest. On the initial testing the lowest score was 18 and on the retest it is 9. The top score on the retest is 42 points and it was 46 on the first test. The initial testing only had one score under 20 points, and on the retest there are five. Nevertheless, the scores demonstrate consistency in the measurement of clinically manifested depression symptoms.

2.2.9 Retest DS–DS-R

Correlations			
		DS	DSR
DS	Pearson Correlation	1	,961**
	Sig. (2-tailed)		,000
	N	33	33
DS-R	Pearson Correlation	,961**	1
	Sig. (2-tailed)	,000	
	N	33	33

**. Correlation is significant at the 0.01 level (2-tailed).

The correlation analysis of the DS forms, conducted on a clinical extract, is shown above. The Pearson correlation coeffiecient is 0.961 which signifies a high level of correlation between the test and the retest.

2.2.10 Ре-тест DS'-DS'-R

Correlations			
		DSp	DSpR
DS'	Pearson Correlation	1	,926**
	Sig. (2-tailed)		,000
	N	33	33
DS'-R	Pearson Correlation	,926**	1
	Sig. (2-tailed)	,000	
	N	33	33

**. Correlation is significant at the 0.01 level (2-tailed).

The correlation of the DS' test-retest is described by a Pearson coefficient of 0.926. This is a slightly lower score than the one in DS but still shows a high level of correlation between the test and the retest.

2.3. Comparison betwen the Control group and the Clinical extract

Scale	Mean		Standard deviation		Number of test subjects	
	Control group	Clinical extract	Control group	Clinical extract	Control group	Clinical extract
DS	7,41	25,48	3,481	11,242	32	33
DS'	7,56	30,76	3,809	9,779	32	33
DS-R	6,78	20,97	4,06	11,395	32	33
DS'-R	7,81	24,39	3,914	9,740	32	33

The table above represents the mean values and the standard deviations for scales DS and DS', as well as the scores for their retests, together with the respective number of test subjects. The mean values for the control group are congruent. Compared to the respective values in the German population, the data from the Bulgarian population are slightly higher.

The DS mean in the normative extract in Germany is 5.46. In Bulgaria it is 7.41 on the initial testing and 6.78 on the retest.

For DS', the mean in the German control group is 7.09. In Bulgaria it is 7.56 on the initial testing and 7.81 on the retest. It can be observed that both in Germany and in Bulgaria, the means on DS' are higher than the means on DS. The same can be concluded about the means in the clinical extract, where DS' again shows higher scores.

The analysis of the standard deviations for the Bulgarian control group shows their inner consistency. Compared to the German results, there are no significant differences. Their DS standard deviation is 4.74 and their DS' standard deviation is 5.47. Significantly higher scores for the standard deviations are demonstrated in the analysis of the clinical extract. Such results can be explained by the dynamics of the depression symptoms in oncological patients.

3. Hypotheses testing and conlusion

3.1 Hypotheses testing

Hypothesis 1: *Considering the cultural characteristics of the Bulgarian population, it is hypothesized that the levels of depression in the control group in Bulgaria will be slightly higher than the levels of depression in the control group in Germany.*

In order to test the hypothesis, the data from the normative extract in Bulgaria are taken into account. Both the men and the women demonstrate higher scores in the lowest recorded raw scores. Only one survey has a score of 0. At the same time the top scores are lower than the top scores in the German population. It can be concluded that it's possible that the levels of depression in the normative Bulgarian extract are slightly higher compared to the German ones. Nevertheless, the absence of scores in the upper register shows that the hypothesis cannot be entirely proven. It should definitely be taken into account that the number of test subjects in the Bulgarian testing is vastly different from the number in the German testing. The data here is based on the analysis of scores by 32 test subjects, while the German extract consists of over 1600 test subjects. In order to completely prove or disprove the hypothesis, a much higher number of test subjects must be acquired.

Hypothesis 2: *The levels of depression in oncological patients will be significantly higher than the levels of depression in the control group.*

In order to test this hypothesis, we can use the data from the clinical extract. The hypothesis can be proven using the results. The levels of depression in the oncological patients, who participated in the testing, are significantly higher than those in the normative extract. The difference in the standard deviations is also significant. The higher standard deviations in the scores of the oncological patients can be explained with the dynamic development of the symptoms which have the tendency to be heavily influenced by the somatic condition, the hospital stay and the ongoing treatment.

Hypothesis 3: *The pilot testing will show good psychometric results for the use of the instrument on the Bulgarian population.*

In order to test this hypothesis, we can use the results from the normative extract, compared to the respective data in the German normative extract, and the data from the clinical extract. As far as the control group is concerned, the instrument demonstrated good psychometric capabilities and similarity to the results from the study in Germany. The observed differences can be explained with the difference in the number of test subjects used in the study.

3.2 Conclusions

The present work had several important aims and tasks. In the course of their fulfillment new questions and the necessity for additional studies in some casesappeared.

The cross-cultural and linguistic standardization has high requirements for the scientists involved. Firstly, the whole procedure is complex and consists of multiple stages. It requires the engagement of many specialists and provision of time necessary for the conducting of all procedures included. On the other hand, the linguistic translation on its own holds many challenges. The present study demonstrated the difficulties before the preparation of the methodology for cross-cultural and linguistic validization. For sure, the methodoly is not complete. The increase in need for more instruments, validated for different cultures, requires the better development of procedures, mostly when it comes to the time limits. At the same time, balance must be pursued between the clarification of all procedures involved and the necessary scrupulousness, without which the validity of the psychometric instruments would be compromised.

The research of relevant literature demonstrates the tendency to increase the methods for validation of psychometric instruments. A big part of the present problems can be solved with the successful application of the translational methods of validation. Their development offers new perspectives for the creation of new psychometric instruments and the enhancement of those already in possession. In this context, the present work offers another instrument, which can be used for any subsequent studies on translational validity.

Several challenges are related to the tested

psychological construct as well. The term depression has seen dramatic development in the XX century and this tendency is continuing today as well. On the one hand, there are difficulties in relation to the introduction of the term in everyday speech, where it loses its technical operationalization and becomes a synonym of multiple and diverse conditions. A big portion of them do not apply to depressive symptoms in the psychiatric sense. On the other hand, there are many epistemological questions which are becoming more and more urgent. The two approaches to the understanding of depression (and psychological constructs as a whole) – the phaenomenological and the descriptive, have found themselves more in a state of conflict, rather than synthesis. The popular descriptive approach seems to be fully dominating the field of psychopathology. All the popular diagnostic manuals and criteria today are based on that approach, but, however precise and well-described, they are not enough for the understanding of the condition, and are definitely not enough for a correct therapeutic approach.

The initial testing of the depression scale showed satisfying psychometric capabilities in the Bulgarian population. The data collected from oncological patients raises questions related to their comorbid psychological disorders. The high levels of depression symptoms necessitate a second look at the way healthcare treats the oncologically ill. Unfortunately, not everywhere in Bulgaria do oncological patients have access to psychological help and psychosocial support. Their psychological suffering is often left unattended or unseen. The present work tried to shed some light on this problem and to offer an instrument, which has the potential to become a part of the instrumentarium of clinical psychologists, working in the field of psychooncology, for the diagnostics and treatment of depression.

From the conducted analysis the first hypothesis of this study cannot be confirmed – that the levels of depression in the normative extract in Bulgaria will be higher than the ones in Germany. Nevertheless, the presence of higher minimal scores and the presence of symptoms almost everywhere underlie the need for this question to be more thoroughly scrutinized over a higher number of test subjects.

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Реконструкция на стернума посредством титаниева плака и оментопластика след дълбока стернална инфекция

Клиничен случай

Хр. Стоев

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Катедра по Сърдечна и съдова хирургия

Sternal reconstruction using a titanium plate and omentoplasty after deep sternal infection

Clinical case report

Hr. Stoev

Medical University Plovdiv

Department of Cardiac and vascular surgery

РЕЗЮМЕ:

Дълбоките инфекции на стернума представляват сериозно усложнение след отворена сърдечна хирургия. Представяме случай на 59-годишна жена с неконтролиран захарен диабет, която е претърпяла аорто-коронарен байпас в друга институция. След интервенцията настъпва стернална дехисценция и инфекция на раната. Следват две неуспешни реконструкции на гръдната стена. Два месеца по-късно пациентката е приета в нашата клиника с тежка диспнея и парадоксално движение на гръдния кош. Компютър-томографското изследване разкрива огромен дефект на гръдната кост, което налага извършване на метална остеосинтеза с титаниева плака и оментопластика. Пациентката е

ABSTRACT:

Deep sternal infections represent a serious complication after open heart surgery. We present a case of 59-year-old female with uncontrolled diabetes mellitus. She underwent aortocoronary bypass graft surgery in another cardiac surgery department. After the surgical intervention sternal dehiscence and wound infection occurred. Two unsuccessful sternal refixations followed. Two months later the patient was admitted to our institution with severe dyspnea and paradoxical movement of the thorax. CT revealed a huge defect of the chest bone and metal osteosynthesis with a titanium plate and omentoplasty was carried out. The patient was followed-up for one year with excellent postoperative result. Computed tomography is of great importance

проследена в продължение на една година с отличен следоперативен резултат. Компютърната томография е от голямо значение като основно диагностично средство при случаи на дълбоки стернални инфекции.

Ключови думи: дехисценция на стернума, метална остеосинтеза, компютърна томография.

as a basic diagnostic tool for cases of deep sternal infections.

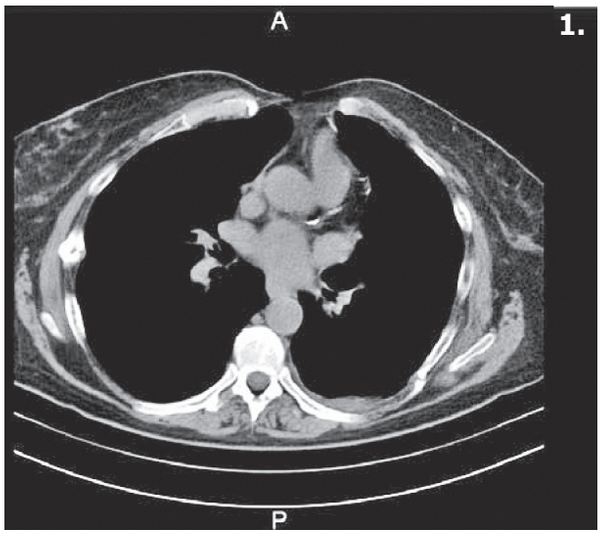
Keywords: sternal dehiscence, metal osteosynthesis, computed tomography.

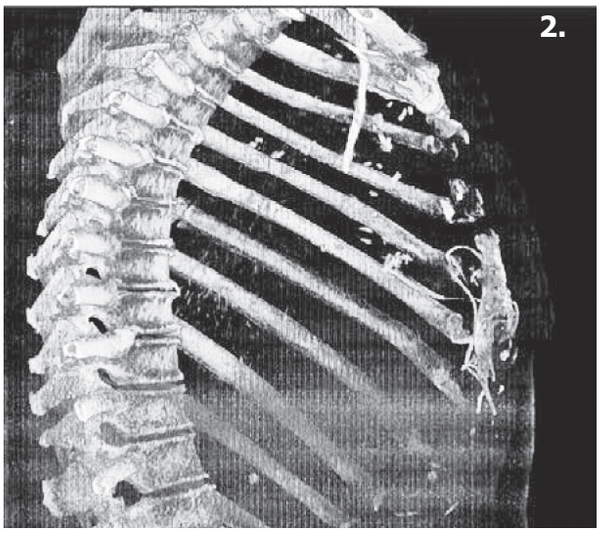
INTRODUCTION

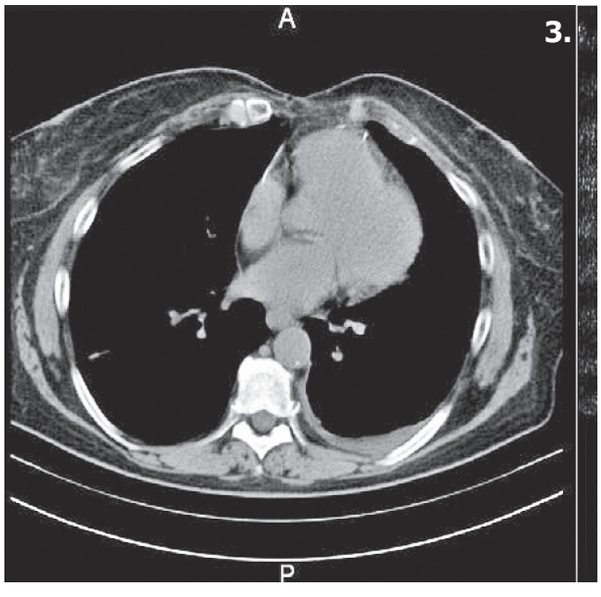
Deep wound infections represent a serious complication after open heart surgery and are directly related to both short and long term survival. Despite advance in prophylaxis, their incidence is still significant - 0.5 - 6.8% [1], and the associated in-hospital mortality ranges from 7% to 35% [2]. Wound complications occur predominantly after aortocoronary bypass graft procedures and authors report a 15% difference in 1-year survival rate among patients who developed deep wound infection and those who did not [3,6].

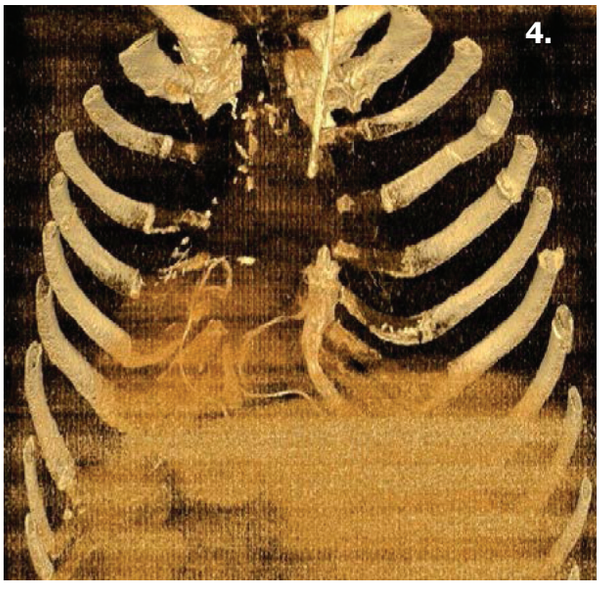
CASE REPORT

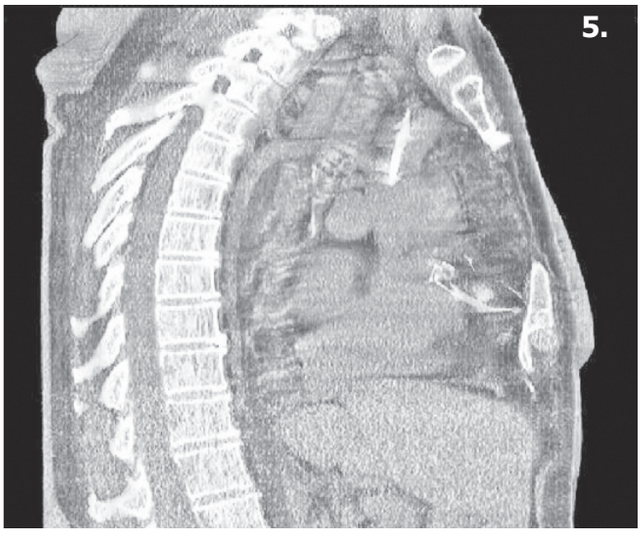
We present a clinical case of 59-year old female with uncontrolled diabetes on insulin therapy for 15 years, who underwent aortocoronary bypass graft procedure in another cardiac surgery institution. In the early postoperative period sternal dehiscence and deep wound infection occurred. Prolonged antibiotic treatment and vacuum-assisted wound therapy was initiated. After two negative microbiological wound samples were achieved, a sternal refixation and secondary closure of the operative wound was performed. After a very short period, the patient was re-hospitalized with evidence of deep wound infection with sternal dehiscence and severe osteomyelitis, which required another refixation. Two months later the patient was admitted in our department with severe dyspnea and leg oedema. Physical examination revealed paradoxical movement of the chest wall during inspiration and sternal dehiscence. Heart movements were visible in the anterior chest wall. Laboratory findings were normal except the serum glucose - 34mmol/l. ECG demonstrated sinus rhythm and left bundle hemiblock. Echocardiography: ejection fraction - 53%; Aortic ring – 1,85cm, Ascending aorta - 2,96cm, Peak gradient - 7mmHg, no regurgitation; Interventricular septum - 1.8cm, end diastolic and end systolic diameters - respectively 3,75cm and 2,44cm, end diastolic and end systolic volumes – respectively 64ml and 30ml; Mitral valve - I grade regurgitation; Tricuspid valve - I grade regurgitation; Septal hypokinesia; Symmetric left ventricular hypertrophy with diastolic dysfunction; no pericardial and pleural effusions. Computed tomography of the thorax demonstrated severe chest bone destruction due to deep sternal infection. Ribs were also affected.











Figures 1-5: ***Preoperative computed tomography scan. The chest bone is severely destructed due to osteomyelitis – deep sternal infection. Some of the ribs are affected***

SURGICAL INTERVENTION

The two pectoral muscles along with the underlying tissue were lifted to the level of the medioclavicular line in order to represent both ends of the sternum and the ribs and a titanium plate (Geister® Sternal Fixation System, Germany) was positioned and secured with steel wires. At the same time, an upper-median laparotomy was performed for mobilization of omentum majus in order to cover the residual defect. The surgical wound was closed with polyamide non-resorbable sutures.

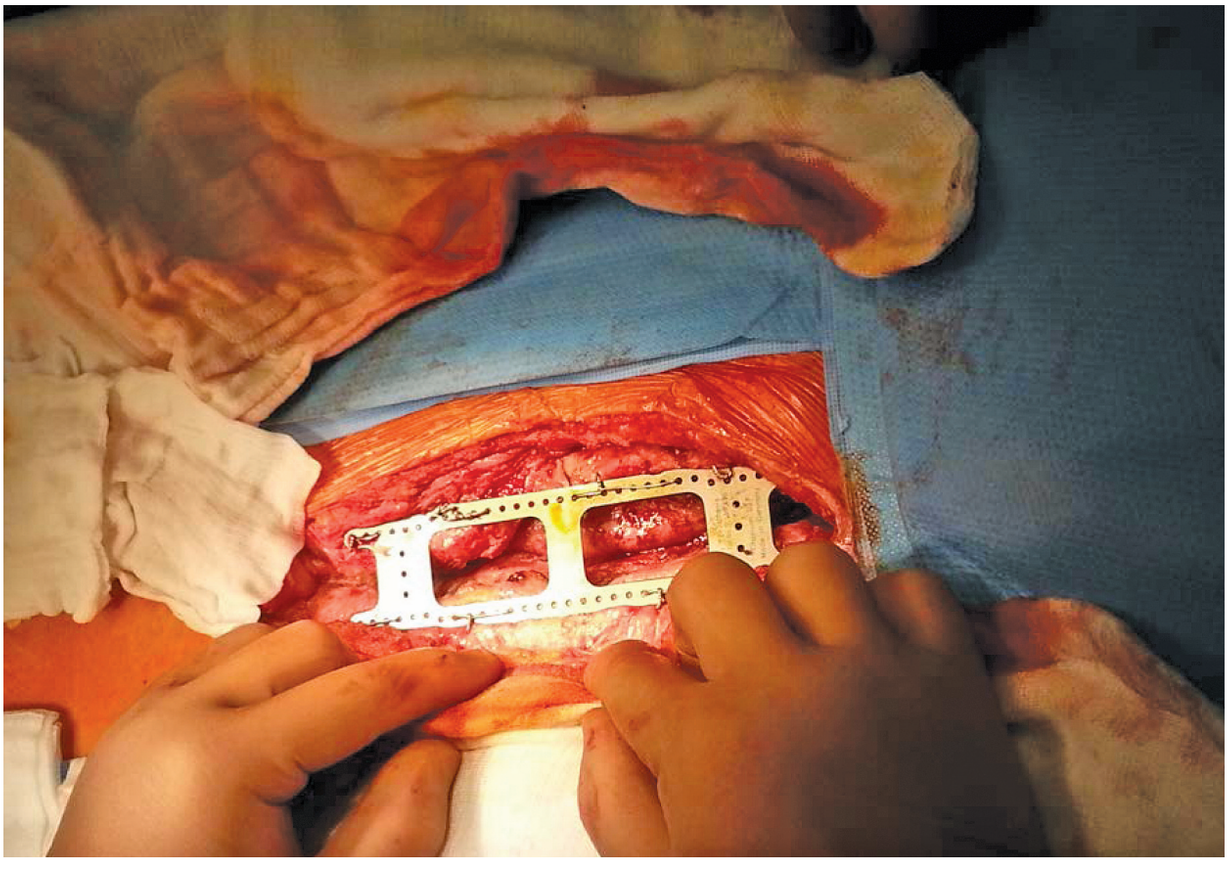


Figure 6: ***Titanium sternal fixation plate is positioned and secured with steel wires***

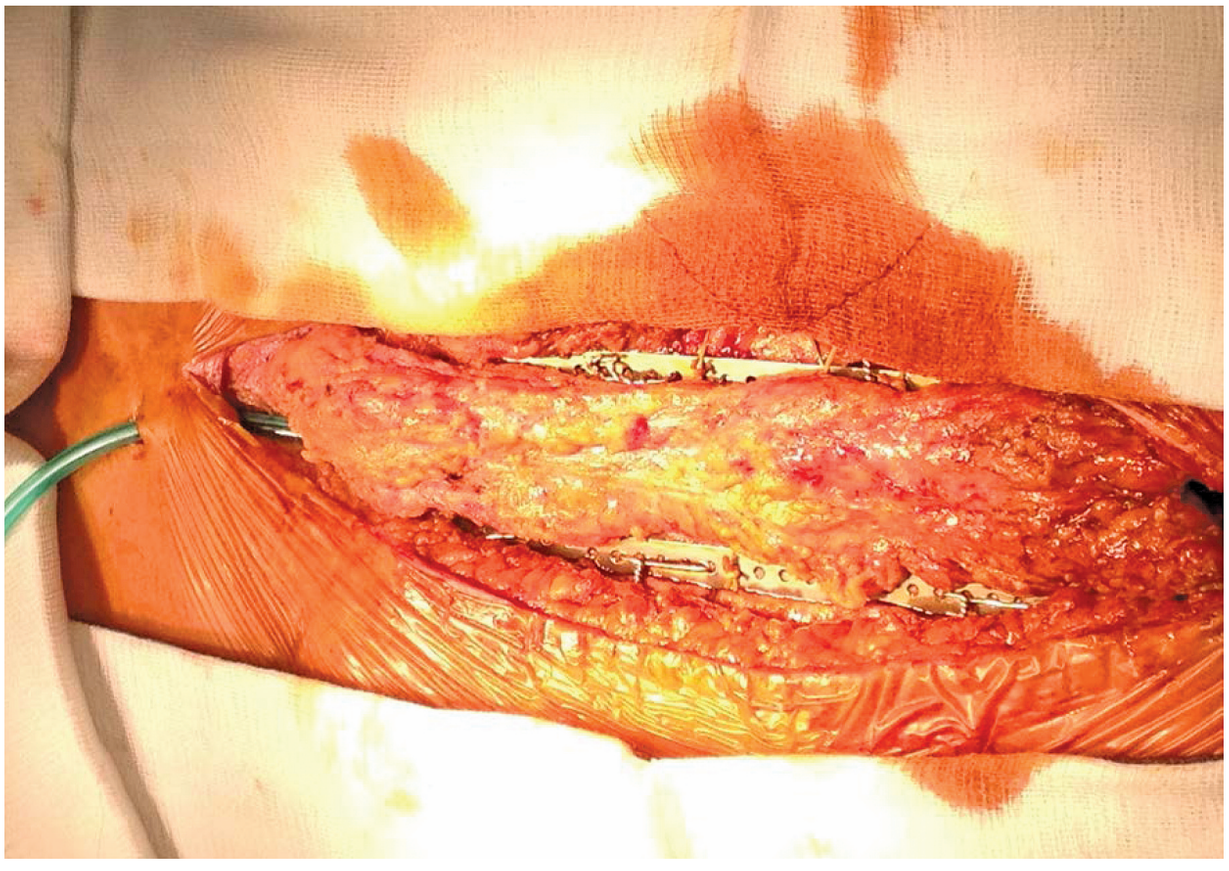


Figure 7: ***Residual space is filled with pedicled omental flap***

Post-operative period was uneventful. The patient was extubated 3 hours after the operation, the drainage was removed on postoperative day 1. During the hospital stay the patient had no evidence of surgical wound infection and was discharged on postoperative day 10 in good health with recommendations for adequate glycemic control. At the follow-up examination (1 week after dehospitalization), the patient had no complaints and no evidence of respiratory failure, the operative wound was healing well and the stiches were removed. 1 year after the surgical intervention the patient refused CT examination.

DISCUSSION

Reconstruction of the chest wall with titanium plate or titanium fixators in cases of severe osteomyelitis and large sternal defects, as in our case, is a basic principle for proper healing of the operative wound [4]. The titanium plate gives stability to the chest wall and significantly reduces the tension on the surgical wound, which leads to faster and safer healing. When the chest wall is stabilized properly, it is fully involved in the breathing process and the tidal volume of the lungs increases, which improves the quality of life [5]. Another advantage is that specialized equipment and instruments are not required in order to perform such procedure. CT is of great importance as a basic diagnostic tool in cases of deep sternal infections. Moreover, the surgeon chooses the proper operative technique according to the CT findings.

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