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Znaczenie krioterapii w procesie rehabilitacji

Streszczenie

Wstęp. Krioterapia redukuje tworzenie się obrzęku, wytwarzanie substancji drażniących oraz ból. Jest stosowana w wielu jednostkach chorobowych, jak i po zabiegach operacyjnych. Stała się coraz bardziej powszechną i dostępną formą terapii.

Cel. Celem pracy jest sprawdzenie dostępności do zabiegu krioterapii wśród mieszkańców wsi i miasta.

Materiał i metody. W badaniu wzięło udział 102 pacjentów z Zamojskiej Kliniki Rehabilitacji, w tym 68 kobiet (66,67%) i 34 mężczyzn (33,33%). Narzędziem badawczym był autorski kwestionariusz ankiety. Wyniki poddano analizie statystycznej.

Wyniki. Dostępność krioterapii według 55,88% respondentów jest wystarczająca, natomiast 44,12% ankietowanych uważa, że jest niewystarczająca. Za wystarczającą dostępnością krioterapii opowiedziało się 54% osób mieszkających w mieście oraz 56% mieszkających na wsi. Najczęściej pacjenci korzystają z zabiegów krioterapii w NZOZ (Niepubliczny Zakład Opieki Zdrowotnej).

Wnioski. Krioterapia jest zabiegiem coraz powszechniej dostępnym dla pacjenta. Osoby zlecające zabiegi przy wykorzystaniu niskich temperatur powinni zwracać szczególną uwagę na przeciwwskazania oraz choroby współistniejące.

Słowa kluczowe: krioterapia, rehabilitacja, fizykoterapia.

The importance of cryotherapy in rehabilitation

Abstract

Introduction. Cryotherapy reduces the swellings, the production of irritants and pain. It is applied to treat many different diseases, as well as surgical treatments. It has become more and more common and accessible form of therapy.

Aim. The aim of the present work was to check the availability of cryotherapy in rural and urban areas.

Material and methods. The study involved 102 patients of Zamość Rehabilitation Center of University of Management and Administration, including 68 women (66.67%) and 34 men (33.33%). The research tool was an author's questionnaire survey.

Results. Availability of cryotherapy according to 55.88% of the respondents is sufficient, whereas 44.12% of respondents believe that it is insufficient. Sufficient availability of cryotherapy was reported by 54% of respondents living in the urban area and 56% - in rural area. Most patients use the cryotherapy treatments in non-public healthcare centers (NZOZ).

Conclusions. Cryotherapy is a treatment more and more commonly available, both for those living in rural and urban areas. Doctors prescribing cryotherapy should pay special attention to contraindications and coexisting diseases.

Keywords: cryotherapy, rehabilitation, physiotherapy.

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INTRODUCTION

Cryotherapy is one of the methods of physical medicine. It finds its application in many diseases and musculoskeletal pain symptoms and in post-surgical treatment. This method is based on short-term effects on the skin surface temperatures (below-1000C). As a result, there is a great number of physiological responses in the site of action. The aim is to assist the basic treatment and facilitate exercising. To get the effect of the therapeutic impact of cryotherapy, the patient is referred after the kinesitherapy treatment. Using the analgesic effect of low temperatures, cryotherapy facilitates the implementation of physical activities [1-4].

Cryotherapy treatment can be performed in the form of topical application to the skin surface (local cryotherapy) or in the form of whole-body systemic (systemic cryotherapy) [5,6].

The desired effect of cryotherapy is an analgesic, related to the interaction of cryogenic temperatures on the nervous system by disabling functional connections with the sensory receptors and release of proprioreceptors conduction in sensory fibers [4,7]. This mechanism also helps to reduce the increased muscle tension [4,8]. Cryotherapy as a valuable action which also reduces post-traumatic edema, inflammation, and the temperature of the tissues, which in different processes, in particular inflammatory conditions is increasing [9,10]. Secondary effect of cryotherapy is an active congestion (increased metabolism) of exposure. There are even four-fold increases in blood flow to the exposure site. Congestion condition is maintained for 2-3 hours. It facilitates the exchange of inflammatory products, carbon dioxide, accelerates metabolism, provides nutritional substrates, molecular oxygen, etc. This allows for obtaining a higher skin temperature and keeping it off longer than other methods of physical therapy (including heat therapy) [11,12]. Cryotherapy, of many physiotherapy treatments can result in the highest vasodilatation, which has a direct impact on the successful use in many different diseases [3,9,10,13-16]. This is confirmed by plethysmography study (the study of blood flow). When making plethysmography of the toe while cooling the area from around the thigh to below the knee for 4 minutes, vasoconstriction was achieved in the first minute and immediate extension after 4 minutes. Within 3 minutes after treatment achieved was a quadruple increase of blood volume, compared to its initial level. Higher blood volume remained even after 2 hours. For comparison, plethysmographic measurements carried out during a heat therapy, showed increased values during a treatment, whereas after 30 minutes obtained was a starting level again [17].

Cryogenic temperatures used systemically also affect the endocrine and immune systems. In the body subjected to the action there occurs an increase in the production of ACTH, cortisol, adrenaline and noradrenaline (testosterone in men), as well as stimulation of cellular and humoral immunity. In addition, it showed a significant positive impact on the psyche of cryotherapy patients. In patients undergoing this form of treatment there was also noted mood improvement, feelings of relaxation and no trouble with falling or staying asleep [18-20].

In everyday clinical practice, cryotherapy is used primarily in the treatment of movement disorders: rheumatoid arthritis, ankylosing spondylitis, osteoarthritis of the peripheral joints and spine, traumatic changes in the musculoskeletal system, osteoporosis and fibromyalgia. General cryotherapy also demonstrated its effectiveness in diseases of the nervous system, such as sciatica, spastic paresis, multiple sclerosis, depressive and vegetative neurosis [20]. Cryotherapy is also used as a form of wellness [5,21].

Contraindications for using general cryotherapy include cold intolerance, cryoglobulinemia, Raynaud's disease, hypothyroidism, acute respiratory diseases, diseases of the cardiovascular system, pus-gangrenous skin lesions, sympathetic neuropathies, local blood supply disorders and hypothermia [1,3,4].

Unlike a general-systemic cryotherapy, a local cryotherapy uses low-temperature impact achieved mainly by using cooled gas (liquid nitrogen, carbon dioxide). It is used directly to the selected area of the patient`s body to obtain a local analgesic effect to facilitate a disease process rehabilitation of occupied muscles and joints [1,3,4,22]. Cryotherapy treatments locally applicable to a specific area of the body cause only local effects: analgesic, neuromuscular, antiedematous and vasodilatative. In this case, systemic effects of cryogenic temperatures stemming inter alia from the influence of the endocrine and immune systems, and the psyche of patients undergoing this form of therapy, are not observed [20].

Indications for using local treatments mainly include inflammations, degenerative and traumatic diseases of the musculoskeletal system, as well as complications in the course of spastic vascular disease, post-traumatic and degenerative diseases of the nervous system in this area are similar to those of whole-body cryotherapy. Contraindications to local cryotherapy are the same as in the case of systemic treatments (except claustrophobia) [1,3-5,9].

Patients should always be qualified by a doctor to cryotherapy treatments. Every time before local as well as systemic cryotherapy treatment, patients should carefully towel dry the skin in the area undergoing cryotherapy. Every treatment is carried out under strict visual control therapist. In case of skin lividity, as well as the appearance of "orange skin" symptoms and the burning sensation and pain, indicating the possibility of frostbite, treatment should be discontinued. Similarly, in the case of general and local cryotherapy, cold therapy is a part of cryorehabilitation; kinesytherapy is advisable after each treatment [23,24].

AIM

The aim of this study was to verify the availability of cryotherapy among respondents living in urban and rural areas.

The research tasks were the following:

1. To show the most frequent surgical areas where low temperatures are applied.
2. To learn the possible ways of associating cryotherapy with other treatments.
3. To learn the reasons for the use of cryotherapy by patients.
4. To provide a degree of risk with regard to the contraindications for cryotherapy among the respondents.

MATERIAL AND METHODS

The study included 102 patients from Zamość Rehabilitation Center of University of Management and Administration, including 68 women (66.67%) and 34 men (33.33%). The population was diversified with regard to age, place of residence and the nature of their work. The number of respondents in the age group 18-25 was 3 people (2.94%) in the group of 26-39 years – 13 patients (12.75%) in the group of 40-59 years – 37 patients (36.27%), in the group aged 60 and over – 49 people (48.04%). Age of the patients ranged between 18 to 80 years. People living in the town constituted 75.49% of the respondents, 24.51% from rural areas. Due to the nature of the work the people were divided into blue-collar workers (19.61%), white-collar (30.39%) or mixed (blue and white-collar workers – 36.27%), and a group of retirees and pensioners – 13.73%. The research tool was the author`s questionnaire survey. In the statistical analysis of the results, the Microsoft Excel program was used.

RESULTS

The research results confirmed that the availability of cryotherapy is sufficient for 55.88% of respondents while 44.12% of people think the opposite. The sufficient availability of cryotherapy was in favor of 54% of the respondents living in urban areas and 56% living in rural areas.

Most patients took local cryotherapy treatments in non-public health care centers – 88.24%. Other institutions were mentioned: 8.82% – hospitals, health-resorts – 6.86% and SPA (Sanus Per Aquam) by 3.92%.

Respondents use cryotherapy most up to 5 times (49.02% of respondents). Once a year was mentioned by 22.55% of respondents; up to 10 times a year by 14.71%, more than 10 times a year – by 13.73%.

Most often local cryotherapy is applied on the spine area – 65.69% and knees – 44.12%. The hock joints – 6.86%, hips – 2.94% , shoulder joint – 7.84%, elbow – 0.98%, wrist and hands – 2.94%. In diseases of the nervous system, cryotherapy was used only by 1.96% of the respondents.

In 95.10% cases, local cryotherapy was associated with other treatments, while only 4.90% were not combined. Most often cryotherapy is associated with other physical treatments – 88.24%, 66.67% – kinesitherapy and massage – 23.53%. Only 0.98% of respondents use manual therapy.

The percentage of people knowing what coolant was used in cryotherapy was 69.61% (liquid nitrogen, 56.86%, carbon – 7.84%, 7.84% chilled air cooling poultice 4.90%) and 30.31 % of respondents could not answer the question.

Most frequently the application of cryotherapy was prescribed by the doctor (in 92.16% of respondents). Respondents also mentioned: opinion of friends (4.90%), articles in the press – 0.98%, the opinion of the therapist – 0.98%, own knowledge – 0.98%

The respondents most often decided to use cryotherapy for health reasons (87.25% of respondents). Also there were mentioned: improvement in physical functioning – 22.55%, strengthening the body and immune system – 4.90%, preventive action – 2.94%, improvement in mental status (improvement of the quality sleep) – 0.98%, and fitness-related – 0.98%.

After cryotherapy treatment, patients most often reported, that their health improved slightly – 57.84%. However, 34% of respondents reported a marked improvement, and 8.82% did not feel any change. None of the persons reported worsening. Most often improvement after cryotherapy was maintained to several months (42.16% of respondents). The improvement maintained several hours in the opinion of 29.41% of respondents, while for 22.55% it improved for a few days.

In response to the question of coexisting diseases, 42.16% said that they suffered from hypertension, 13.73% – of coronary heart disease, diabetes – 6.86%, thyroid problems –5.88%, kidney disease – 3.92%, atherosclerosis – 0.98%. not No comorbidities were reported by 43.14% of the respondents.

DISCUSSION

Patients often took cryotherapy treatments in NZOZ (autonomous health care centres), but treatment is also available in hospitals, sanatoria and spa salons. Most respondents were in favor of the use of a series of cryotherapy treatments five times a year. Narkiewicz also indicates the increasingly common availability of treatments using liquid nitrogen. He mentions that in Poland now there are over 5,000 machines and 100 local cryotherapy cryochambers and Cryosauna. Nitrogen cryotherapy treatment by the National Health Fund is priced at 8 points; using carbon dioxide or cooled air – 3 points. Institutions without a contract with the NHF estimate treatment costs from 8 to 16 zlotys for one area of the body subjected to surgery, and from 18 to 40 zlotys for overall body [11].

Mostly local cryotherapy treatment is applied around the spine and knees. In the literature, one can often see reports on the impact of cryotherapy for peripheral joints and the joints of the spine. Oosterveld et al. used 3 kg bags of frozen chips around the front of the knee for 30 minutes, which resulted in lowering the temperature by 9.4°C at the joint. However, the skin surface temperature was 16.4°C in all patients [25]. A significant drop in temperature within the joint may be associated with a small amount of fat in the area. Chiang points to significant decrease in the subjective feeling of pain in patients with osteoarthritis of the knee and reduced swelling and improved range of motion by combining cryotherapy (NO2) with kinesitherapy [22]. Research by Levy et al. on the local application of cold to the area of the shoulder showed a slight decrease in temperature. This area is covered with a layer of muscles in significant contrast to the knee joint [26]. Myrer et al. have shown that fat tissue thickness of 20 mm reduces the penetration of cold to a depth of 1 and 3 cm three times on the average, as compared with a layer of 8 mm [27]. In the case of the spine, the results Giemza et al. demonstrated high effectiveness of cryotherapy in conjunction with DBC method in streamlining symptoms of low back pain [12].

The use of low temperatures in neurological diseases is underestimated. Especially in Parkinson's and Alzheimer's disease, in which cryotherapy reduces the effect of tremor.

Cooper et al. used low temperatures in order to improve hand function in patients with significant clinical trembling. However, Allison and Abraham, and Sliwinski achieved a significant reduction in spasticity. This is probably caused by release of nerve conduction [28-30]. Miller in his research applied cryotherapy and kinesitherapy in patients with multiple sclerosis with fatigue syndrome. He achieved a statistically significant reduction of disability degree of EDSS scale and improvement of the strength of the quadriceps and iliopsoas muscle compared to patients with MS without fatigue syndrome [31].

Webb, Morsi, Scarcella and Cohn proved effectiveness of cryotherapy after orthopedic surgery, especially knee and hip. This results in the reduction of pain, reduction of analgesics, reducing the scope of wound drainage and a faster return to mobility [8,32,33].

Most respondents supported using cryotherapy for health reason, others wanted to improve their physical fitness, strengthen the body and getting resistance as preventive measure, improve mental state (to improve the quality of sleep) and for biological regeneration. In the literature we can find many reports of cryotherapy in the treatment of various diseases of the peripheral joints, spine, neurological and chronic diseases, as well as after surgery [8,12,28-33]. Narkiewicz suggests that cryotherapy may be used much more widely in cosmetics. This allows a much better absorption of active ingredients of ointments, creams, gels and local increases their effect, allows for completely painless depilation and perfectly firms the skin [12]. Rymaszewska et al. indicates a possible antidepressant effect of cryotherapy treatments [7].

Disturbing is the fact that some respondents reported other coexisting diseases, which are a contraindication to cryotherapy, not only local, but also systemic. That is why it is so important for patients' health to pay attention for possible side effects in the presence other diseases. Recent studies have reported that cryotherapy cannot be treated as a completely safe form of therapy and wellness. This is related to the strong autonomic stimulation of the cardiovascular system. This applies as well to patients with cardiac disease, and to healthy ones [34]. The number of contraindications constantly changes as learning about the mechanisms of action of cryogenic temperatures. In recent years, there have been attempts to apply cryotherapy in patients in the terminal stages of cancer, especially taking into account its analgesic, antidepressant, and relaxing properties [35].

CONCLUSIONS

1. Cryotherapy is a treatment more commonly available, both for those living in rural and urban areas.
2. Cryotherapy can be related with other therapies such as magnetic field, laser, ultrasounds however there should always be considered contraindications to those treatments.
3. Doctors prescribing cryotherapy should pay special attention to contraindications and coexisting diseases.
4. Cryotherapy is a treatment with a wide range of effects in many different diseases, such as musculoskeletal injuries, neurological diseases, and cosmetics.

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