Original Article

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Determination of the Activities Affected Due to Cold Intolerance after Peripheral Nerve Disorders

Periferik Sinir Yaralanmaları Sonrası Soğuk İntoleransı Nedeniyle Etkilenen Aktivitelerin Belirlenmesi

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ABSTRACT

Objective: Our study was designed to determine the activities affected due to cold intolerance (CI) after peripheral nerve disorders.

Methods: Participants aged 18-65 who were diagnosed as having peripheral nerve disorder in the last year and whose activities were affected due to CI and who scored 30 or higher on the Turkish version of the CI Symptom Severity (CISS) questionnaire were included. The problematic activities due to CI were determined by a semi-structured interview. Activities were examined according to the third edition of the Occupational Therapy Practice Framework as activities of daily living (ADL), instrumental ADL (IADL), rest and sleep, education, work, play, leisure and social participation.

Results: Fourty-five individuals (15 men, 30 women) with a mean age of 42.28±13.25 were included. The mean of the CISS score was 51.18±16.69. Twenty three different activities were identified. Due to CI, the most difficult activity for women was dishwashing and hand washing for men.

Conclusion: Participants with peripheral nerve disorders had difficulty mostly in the ADL and IADL due to cold intolerance. It was found that exposure to cold air and water, decreased fine motor skills due to cold, grasping of cold objects, and exposure to cold in the workplace caused difficulties in these activities. We think that it should be considered that the activities in which individuals have problems may be caused by CI.

Keywords: Peripheral nerve injuries, nerve compression syndromes, cold hypersensitivity, occupations

ÖZ

Amaç: Çalışmamız, periferik sinir yaralanmalarından sonra soğuk intoleransı (Sİ) nedeniyle etkilenen aktiviteleri belirlemek için tasarlanmıştır.

Yöntemler: Son bir yıldır periferik sinir yaralanması tanısı alan, aktivitelerinin Sİ'den etkilendiğini belirten ve Sİ Semptom Şiddeti Ölçeğinin (CISS) Türkçe versiyonundan 30 ve üzeri puan alan 18-65 yaş arası bireyler dahil edildi. Sİ sebebiyle problemli aktiviteler yarı yapılandırılmış bir görüşme ile belirlendi. Aktiviteler, Ergoterapi Uygulama Çerçevesinin üçüncü basımına göre günlük yaşam aktiviteleri (GYA), yardımcı GYA'ları (YGYA), eğitim, dinlenme ve uyku, serbest zaman, iş, oyun ve sosyal katılım şeklinde analiz edildi.

Bulgular: Çalışmaya yaş ortalaması 42,28±13,25 olan 45 kişi (30 kadın, 15 erkek) dahil edildi. Ortalama CISS skoru 51,18±16,69 idi. Toplam 23 farklı aktivite belirlendi. Kadınlarda Sİ'ye bağlı en zorlanılan aktivite bulaşık yıkamak ve erkeklerde ise el yıkamaktı.

Sonuç: Periferik sinir yaralanması olan bireyler Sİ nedeniyle özellikle GYA ve YGYA'da zorluk yaşamışlardır. Özellikle; su ve soğuk hava ile temasın, soğuğa bağlı azalan ince motor becerilerin, işte soğuğa maruz kalmanın ve soğuk cisimleri manipüle etmenin, aktivitelerde zorluklara neden olduğu görülmüştür. Bireylerin sorun yaşadığı aktivitelerin Sİ'den kaynaklanabileceğinin göz önünde bulundurulması gerektiğini düşünüyoruz.

Anahtar Sözcükler: Periferik sinir yaralanmaları, sinir sıkışma sendromları, soğuk hipersensitivitesi, oküpasyonlar

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Introduction

Cold intolerance (CI) or cold hypersensitivity is an atypical response when the injured part is exposed to cold, causing discomfort or protection from the cold (1). CI may be seen common after upper extremity injuries and lead to severe pain and sensory dysfunctions (2,3). In the literature, the incidence of CI is stated as 83% in individuals with peripheral nerve disorders. Symptoms related with CI start in the beginning of the injury in 43% of these individuals (4). In addition, it was stated that these individuals had no or minimal change in CI severity 1-5 years after surgery (5).

CI can affect activities of daily living (ADL), roles, activity participation, activity pattern, and quality of life. Symptoms caused by cold in daily life generally arise from water, air temperature, season, air conditioning, vibration and objects used. These triggering factors also affect many activities such as night sleep, repair work, gardening, skiing, car washing, fishing, bathing, unpacking from the refrigerator or freezer. Individuals apply several strategies to perform these activities, which cause changes in occupational performance and activity pattern. At the same time, CI affects multiple roles such as working and can cause role changes (6-8).

Lithell et al. (9) stated in their study involving 40 patients who had hand injuries, that CI could not be defined or evaluated with a symptom or symptom group due to different subjective symptoms of individuals. For this reason, the effect of CI is based on subjective definitions in relation to the situation in each individual's life. The environment, interests, and activities of the individuals determine whether CI will create an obstacle for the person (10). The purpose of our study, which we planned from this point of view, was to determine the activities affected due to CI in individuals with peripheral nerve disorder.

Methods

Participants with peripheral nerve disorder who were admitted to Hacettepe University Department of Occupational Therapy Hand Rehabilitation clinic were included. Inclusion criteria were having peripheral nerve disorder in the last year, being between the ages of 18-65, having a score of 30 or above on the CI Symptom Severity (CISS) questionnaire (11), stating at least one activity affected due to the CI and volunteering to participate in the study. Demographic data (age, gender, dominant hand, injured hand, injured nerve, surgery, time after injury) of individuals were recorded. CI severity was assessed with CISS questionnaire. The activities that individuals had difficulty due to CI were identified by an interview. Before and during the assessment, individuals did not receive any treatment for CI. All individuals were informed verbally and with informed consent about that the aim and content of the research. The research was approved with the decision number GO 17/810 by the Hacettepe University Ethics Committee.

Cold Intolerance Symptom Severity (CISS) Questionnaire

This questionnaire was developed in 1997 to evaluate the CI severity after peripheral nerve disorders (4). The questionnaire has six questions. Questions consist of CI symptoms (weakness, pain, stiffness, numbness, skin color change, swelling), conditions in which tolerance to cold is decreased, activities affected as a result of symptoms, what the person does to avoid symptoms and the relief duration of symptoms in a warm physical environment. The score is between 4-100. When the score increases the severity of the CI increases (12). A score of 30 or above means abnormal sensitivity to cold [Ruijs et al. (11), 2006]. The validity and reliability of the Turkish version of the questionnaire was conducted in 2017 (13).

Semi-Structured Interview

The activities that individuals had difficulty with due to CI as a result of peripheral nerve disorder were determined by the first author with a one-to-one semi-structured interview. Activities affected due to CI after disorder were examined in 3 groups as self-care, productivity and leisure activities (14). Firstly, definition of these 3 activity groups was made to individuals and activities involving these groups were explained. Then the following questions were asked:

• What are the self-care activities you want to do/need to do, or are expected to do but unable to accomplish because of the sensitivity you experience due to cold?

• What are the productivity activities you want to do/need to do, or are expected to do but unable to accomplish because of the sensitivity you experience due to cold?

• What are the leisure activities you want to do/need to do, or are expected to do but unable to accomplish because of the sensitivity you experience due to cold?

Statistical Analysis

The SPSS 21 program was used to evaluate the demographic data. While evaluating the demographic data, descriptive statistics (mean and standard deviation, minimum and maximum values) were performed. The activities that individuals stated as a result of semi-structured interview were analyzed as ADL, instrumental ADL (IADL), education, work, play, rest and sleep, social participation and leisure according to the third edition of Occupational Therapy Practice Framework (15). The activities in which men and women had difficulties were examined separately.

Results

Fourty-five individuals (15 males, 30 females) with a mean age of 42.28±13.25 and who were right-handed were included. Right hand was injured in 26 (57.8%) individuals and left hand in 19 (42.2%). Disorder types were median nerve transection (n=6), ulnar nerve transection (n=9), median and ulnar nerve transection (n=5), carpal tunnel syndrome (n=20), cubital tunnel syndrome (n=3) and thoracic outlet syndrome (n=2). All nerve transections underwent primary nerve repair. Ten compression neuropathies were followed-up conservatively and the other 15 underwent decompression operation. The mean time after injury was 8.02±4.54 months (minimum 0, maximum 12). The mean of the CISS score was 51.18±16.69.

As a result of the semi-structured interview, 23 different activities (6 ADL, 11 IADL, 4 leisure activities, 1 work and 1 social participation activity) were determined. Individuals did not state the activities in play areas, rest and sleep and education due to CI. Washing dishes was the most difficult activity due to CI for women (n=19) and washing hands was the most difficult for men (n=9). Activities in which men and women with peripheral nerve disorders had difficulties due to CI are shown in Table 1.

Discussion

In our research, individuals with peripheral nerve disorders experienced difficulties due to CI, especially in ADL. It was observed that exposure to water and cold air (bathing, walking outside), decreased fine motor skills due to cold (button, zippering), grasping of cold objects (bus poles), and exposure to cold in the workplace caused difficulties in these activities. In a study with individuals with finger replantation or revascularization, it was found that CI caused major problems in work and leisure activities (16). Individuals even change their jobs due to CI (6). We think that it should be considered that the activities in which individuals have problems may be caused by CI.

When CI is not treated, it may affect activities and participation negatively (17). In our study, it was found that individuals in both gender experienced difficulties mostly in basic and instrumental daily living activities due to CI. The activity that women experience the most difficulty due to CI is determined as washing dishes, while it is washing hands for men. In a study conducted on the Swedish population, the impacts of CI on activities in individuals with hand injuries were examined and activities different from our findings were found. Some of these activities were skiing, fishing, hunting, cycling and swimming (6). We think that specifying different activities between the Swedish population and our population is a result of cultural differences. Culture affects activities as well as perception of health and disease. A person's choice of activity, performing certain activities and his/her perception of certain activity results are influenced by his/her cultural beliefs (18,19). Therefore, cultural factors should be taken into consideration when evaluating activities affected due to CI.

The fact that the "walking outside" activity was frequently stated as a result of our study suggested that the temperature of the outdoor environment affect the activities of individuals. Another reason why different and various activities were stated in Swedish study for outdoor activities such as hunting and skiing might be due to the fact that they were exposed to more

Table 1. Activities which men and women with peripheral nerve disorders have difficulties due to cold intolerance

Activity areas	Women	Men
Activities of daily living (ADL)	Handwashing (n=17) Bathing (n=11) Button (n=1) Zippering (n=1)	Handwashing (n=9) Bathing (n=8) Eating (n=1) Doing up shoelace (n=1)
Instrumental activities of daily living (IADL)	Dishwashing (n=19) Cleaning (n=8) Washing carpet (n=1) Shopping (n=3) Squeezing cloth (n=3) Bus transportation (n=2) Washing vegetables (n=2) Cleaning out anchovy (n=1) Receiving food from refrigerator (n=3)	Bus transportation (n=8) Cleaning (n=2) Driving (n=1) Shopping (n=2) Talking on the phone (n=1) Dishwashing (n=2) Washing vegetables (n=1) Receiving food from refrigerator (n=1)
Rest and sleep	-	-
Education	-	-
Work	Working outside (n=1)	Working outside (n=6)
Play	-	-
Leisure	Walking outside (n=10) Doing sports (n=1)	Walking outside (n=4) Doing sports (n=2) Playing saz (n=1) Watering the garden (n=1)
Social participation	Travel with family and friends (n=6)	Travel with family and friends (n=1)
Total number of activities	18	19
Total number of stated activities	90	51

n: Number of participants

cold air and cold water. Since our country has a relatively warm climate compared to the northern countries, these differences in activities may emerge.

CI is common after peripheral nerve disorders, and individuals experience severe and long-lasting pain due to this abnormal response to cold. Therefore, the activity participation of individuals also becomes difficult (7). In our study, we showed that individuals with peripheral nerve disorders experienced difficulties due to CI in many activity areas. Therefore, treatment programs for CI should include occupation-based intervention approaches that include adaptive strategies and activity adaptations to reduce cold-related pain and excessive response. For this purpose, to minimize exposure to cold air and water and to increase activity participation; methods such as choosing appropriate body clothing, using clothing such as heaters and gloves, changing the grip pattern in activities can be applied (6,8).

Individuals who had a peripheral nerve disorder were included in our study and these individuals were evaluated in a certain period of time, and problematic activities affected due to CI were determined. Öksüz et al. (20) listed the problematic activities in Turkish patient population with hand injury by using Canadian Occupational Performance Measure and determined similar activities with our study. According to this study, patients with hand injuries indicated activities such as cleaning the house, washing dishes, buttoning up and doing up shoelace among the activities they experienced difficulty most. Therefore, one of the reasons of the problems in these activities may be CI. In future studies, we think that it is important to evaluate the CI in individuals with other upper extremity injuries and to make inferences about the nature and treatment of CI by performing long-term follow-up results.

Study Limitations

The most important limitation of our study was the absence of individuals' views regarding their problematic activities due to CI. Another limitation of our study was that we did not evaluate the occupational performance of these individuals associated with CI. In future studies, a detailed qualitative study may be conducted on this issue. In addition, the personal, environmental and activity-related factors that may affect the occupational performance may be examined in detail, and the problems experienced due to CI may be revealed in a person-centered manner.

Conclusion

CI after peripheral nerve disorders is a common condition and because of this abnormal response to cold, patients may experience limitations in their occupations. In our study, the activities in which individuals with peripheral nerve disorders experienced difficulties due to CI were evaluated. We found that individuals experienced difficulties specially in basic ADL and IADL due to CI. Most difficult activity for women due to CI was washing dishes and it waswashing hands for men. Exposure to water and cold air, decreased fine motor skills due to cold, grasping of cold objects, and exposing to cold in the workplace cause difficulties in these activities.

Ethics

Ethics Committee Approval: The research was approved with the decision number GO 17/810 by the Hacettepe University Ethics Committee.

Informed Consent: All individuals were informed verbally and with informed consent about that the aim and content of the research.

Peer-review: Externally peer reviewed.

Authorship Contributions

Surgical and Medical Practices: Ö.B.A., Concept: Ö.B.A., Ç.Ö., Design: Ö.B.A., Ç.Ö., Data Collection or Processing: Ö.B.A., Analysis or Interpretation: Ö.B.A., Ç.Ö., Literature Search: Ö.B.A., Writing: Ö.B.C., Ç.Ö.

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