

WORK-RELATED ULNAR NERVE ENTRAPMENT AT ELBOW: A PROSPECTIVE STUDY OF OCCUPATIONAL RISK FACTORS AND REPETITIVE MOTION

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Abstract

Objective: The present study aims the identification of the predictive factors responsible for ulnar nerve entrapment at the elbow (UNEE) because of work-related musculoskeletal disorders (WRMD) in repetitive work.

Study design: A longitudinal study

Place and Duration: This study was conducted at Maroof Health care Pvt Limited Islamabad from March 2021 to March 2022

Methodology: A total of 330 participants were included in the present study. All the participants were examined by a physician and they were asked to complete a questionnaire. Predictive factors related to ulnar nerve entrapment at the elbow were assessed by multivariate and bivariate analysis. The selection of the subjects was done according to their occupation which included workers in the clothing industry, shoe industry, packaging departments, food industry, and cashiers in the supermarket.

Results: An annual incidence of 0.8% was estimated. The only biomechanical factor responsible for UNEE was holding a tool in a certain position for a long duration, whereas, obesity was recognized to increase the risk of UNEE along with the presence of carpal tunnel syndrome (CTS), cervicobrachial neuralgia, epicondylitis, and radial tunnel syndrome. The left side of 6 participants was affected, the right side of 4 participants was affected and the remaining 2 had a bilateral issue.

Conclusion: Ulnar nerve entrapment at the elbow is associated with the biomechanical factor which is holding a tool in position, obesity, and upper limb work-related musculoskeletal disorders, especially epicondylitis on the medial side.

Introduction

Compression of nerve in the localized region is common and the incidence has been increasing in the upper limb for the last 20 years [1]. The neuropathies by which the upper limb usually suffers, the most common is median nerve entrapment and then comes the UNEE [2]. The commonest causes known for upper limb nerve injuries are occupational and recreational activities, however, acute trauma of the elbow and keeping the arm in a flexed position for a long duration are also responsible for such compression neuropathies [3]. CTS, nerve scarring and physical compression are also common causes [4]. Ulnar nerve neuropathy is usually checked by a clinician in a medical setup, nonetheless, diagnosis is difficult most of the time [5]. The reason for these conditions undergoing undiagnosed is that the symptoms mimic other musculoskeletal problems. By the time the patient visits the clinician, the motor and sensory functional deficit reaches a great extent. The late diagnosis and provision of treatment negatively impact the prognosis and beneficial clinical outcomes [6].

CTS and compression of the ulnar nerve at the wrist or elbow are two common disorders related to the compression of nerves. They induce disability and symptoms that severely affect the life quality of an individual, especially if the pain is exaggerated [7]. The psychological health of a person is also influential on the alleviation or worsening of the symptoms of CTS as well as UNEE [8]. Psychological factors should be considered while diagnosing or treating the condition [9]. There are certain drugs that are also responsible for influencing the symptoms of UNEE [10]. In the present study, the longitudinal approach is used for the analysis of UNEE and many predictive factors are looked at which are responsible for the onset of the symptoms and other WRMD.

Methodology

A total of 330 participants were included in the present study. The clinical symptoms of the participants were assessed by a clinician. A questionnaire was completed by the participants to gather the data. The selection of the subjects was done according to their occupation which included workers in the clothing industry, shoe industry, packaging departments, food industry, and cashiers in the supermarket.

The diagnosis of the UNEE was made on the basis of the criteria as follows:

1. Motor and sensory symptoms in the area of distribution of the ulnar nerve
2. Difficulty in the mobility of the elbow
3. Elbow edema
4. Exaggeration of the symptoms of compression of cubital tunnel
5. Weakness of the hand

The relationship between risk factors and UNEE was studied in all the subjects by bivariate association i.e. Fisher test and chi-square. The variables that have an association with WRMD, such as age, gender, and other risk factors are studied separately.

A significant loss of follow-up was seen in the activity sector and age. Most of the patients were younger than 30 years and most of them were cashiers at supermarkets. Complaints of shoulder pain were common in those who lost follow-up more frequently.

Results

Among the 330 participants selected for the study, 231 (70%) were female and 99 (30%) were male. A total of 12 (3.63%) were diagnosed with UNEE at baseline. The left side of 6 participants was affected, the right side of 4 participants was affected and the remaining 2 had a bilateral issue. Overall 10 of the 12 participants recovered in a duration of 3 years. Out of these, 2 with bilateral UNEE had recovered too. Paraesthesia in the fifth and fourth fingers was found in 6 subjects. About 2 had paraesthesia in the other fingers too. One of the participants had also reported pain in the elbow.

A total of 9 of the 12 cases were employed in the electrical appliances industry (3 cases), manufacturing of sports accessories (1 case), car brakes (2 cases), and household appliances industry (3 cases). The remaining three were in the packaging department. The bivariate study shown in table 1 indicates that the predictive factors associated with UNEE are age, BMI, gender, use of elbow as a support, and holding a tool. Obesity and biomechanical reason, which is holding a tool, had a significant association with UNEE. Cervicobrachial neuralgia, CTS, radial tunnel syndrome, and medial epicondylitis were significantly associated with UNEE as given in table 2.

Table 1. Risk factors associated with UNEE

Risk factor	Presence or absence	Number of participants (n=330)	Incident cases (n=12)	Cumulative incidence %
				2.7
Age (Years)	<30	92	1	1.6
	30-40	101	4	2.4
	41-50	88	5	2.7
	51-60	49	2	5.9
Gender	Male	99	1	0.7
	Female	231	11	3.6
Activity Sector	Supermarket cashier	30	0	0.0
	Sports manufacturing industry	26	1	4.3
	Household appliances industry	48	3	4.4
	Car brakes	42	2	4.3
	Electrical appliances industry	60	3	2.3
	Packaging department	80	3	2.3
	Food industry	74	0	0.0
BMI	Normal	201	7	2.2

	Overweight	69	2	3.1
	Obesity	60	3	1.7
Use of elbow as a support	Yes	42	1	8.1
	No	288	11	2.5
Hold the tool in position	Yes	197	9	2.8
	No	133	3	2.5

Table 2. Incidence of UNEE and WRMD presence

WRMD	Presence or absence	Number of participants (n=330)	UNEE cases (n=12)	Cumulative incidence %	Fisher test (p-value)
Cervicobrachial neuralgia	Yes	29	2	7.5	0.07
	No	301	10	2.2	
Medial epicondylitis	Yes	25	3	2.1	<0.01
	No	305	9	14.5	
CTS	Yes	101	5	5.9	<0.05
	No	229	7	1.9	
Radial tunnel syndrome	Yes	320	11	2.5	0.01
	No	10	1	9.2	

Discussion

The present study is suggestive of occupational factors and obesity as a risk factors for UNEE. The occupational factors, especially holding in position are more significant. Age is a major risk factor for CTS [11] and it is also potentially associated with peripheral neuropathies [12].

Donald et al conducted a study on the entrapment of the ulnar nerve and the risk factors associated with UNEE. They studied their subject radiologically. They described the etiology of compression as thrombosis and aneurysm associated with age and other diseases [13]. Similarly, Novotna et al studied the association of age with UNEE. They included 103 patients in their study who were suffering from compression symptoms such as paraesthesia, hypoesthesia, weakness of the hand, and hypertrophy of the hand. They concluded that the symptoms were more prominent in elderly patients and also the healing was slower in such patients [14].

Laura et al studied work-related factors associated with UNEE. They observed that the participants who used to elevate their arms for a longer duration at work were more prone to the development of UNEE [15]. Their study had a similar model and similar results compared to our study. Moreover, they also included data related to smoking individuals and showed that smoking also has a strong association with UNEE symptoms. Alexis et al studied 598 participants for a duration of 5 years. They emphasized the association of age, gender and occupation with UNEE. Their results were similar to the present study as they found a strong relationship between occupational activities and BMI with UNEE [16].

Conclusion

The entrapment of the ulnar nerve is strongly associated with holding a tool and doing work for a long time with the support of the elbow. Age, gender and BMI also greatly influence the symptoms of UNEE and WRMD, especially medial epicondylitis, CTS, radial tunnel syndrome and cervicobrachial neuralgia.

Permission

It is taken from the review committee

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Conflict of interest

None

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