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Research about the association between smartphone use and carpal tunnel syndrome research.

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Article information

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Abstract

Carpal tunnel syndrome (CTS) is the most common upper extremity nerve compression syndrome Which affect the median nerve .

Patients with CTS experience reduced sensation ،dexterity, and function.

Irreversible changes in nerve structure and function due to demyelination and axonal damage can occur in long-standing case.

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I) Introduction

In 2019, Japan's Ministry of Internal Affairs and Communications reported that with the proliferation of information and communications technology (ICT), ownership of ICT devices (smart phone) is increasing annually.

According to the International Telecommunication Union Statistics,2 just over 51% of the global population, or 4 billion people, were using the Internet by the end of 2019.3 In 2018, the Massachusetts Institute of Technology stated that 95.7% of the population in Japan owned mobile devices, with 79.2% owning smartphones. These data also show a steady increase in time spent on the Internet; in 2019, 89.8% of people aged over 20 years, across 40 000 households, spent 112 min daily using the Internet.1 However, research has highlighted problems associated with using ICT devices.

(smartphone), users risk repetitive strain injuries by repeatedly pressing their thumbs or using a combination of thumb/finger motions.4-6 Several studies have reported a high rate of musculoskeletal disorders in young individuals, attributable to smartphone use.7-10 Alosaimi et al4 found that 650 university students (27.2% of their sample) used a smartphone for over 8 h daily (mean and standard deviation of 6.65 ± 4.3 h). Woo et al11 analyzed the use of smartphones or tablet computers, wherein people use their thumbs/fingers to

manipulate the screen; it was found that these activities put excessive force on the median nerve, compressing it if these repetitive movements lasted for long periods.

Additionally, on average participants used electronic devices for more than 3 h daily and reported musculoskeletal complaints.12 Baabdullah et al3 found that this pain was positively correlated with the degree of smartphone use, with 66.4% of participants being smartphone addicts and 19.1% of those with pain testing positive on Finkelstein's test.

Although these reports offer valuable insights, they only explore the musculoskeletal effects of ICT device usage vis-à-vis a single hand disorder. It is, therefore, necessary to investigate the association of prolonged ICT device utilization with prolonged ICT device utilization with multiple hand disorders.

Accordingly, this study examined the relationship between hand symptoms and the amount of time spent using electronic devices in healthy adults, as well as the cutoff value for positive hand symptoms.

II) Aim:

To assess the association between smartphone, use and the development of CTS.

III) Participants

The participants were from Misurata Medical College students. With sample size of 300 student, which employed a Case Control study design.

The studies of Controls (CTS free) and case (CTS positive) groups were based on the disease-specific Boston Carpal Tunnel Questionnaire, divided to 200 control and 100 cases.

The questionnaire is concerned in pertains demographic characteristics, including age, sex, nationality, marital status, smoking, and presence of chronic diseases (DM, hypertension,

hypothyroidism, and RA). And the duration of smartphone use is either less or more than 8 hours per day.

IV) Ethics considerations:

Participation in the study was voluntary, and participants could withdraw from the study at any time. The questionnaire was accompanied by a consent form that explained the purpose of the research and assured the participant of confidentiality. Data were anonymized and used for research purposes only. All data used in the study are available for interested researchers upon request and approval from the author.

V) Statistical analysis:

Statistical analyses were performed using IBM-SPSS version 25.0. Descriptive statistics were calculated (frequencies, percentages, means, standard deviations and medians) to describe the categorical and numerical variables. The Chi-square test was used to quantify the associations between categorical variables. Correlation was used to identify the association between variables related to the study outcome. A P value ≤ 0.05 and 95% confidence intervals are used to represent the statistical significance and precision of the results.

VI) Results

One hundred (N = 100) cases and two hundred controls (N =200) participated in the study. Table 1 shows the participants' sociodemographic characteristics. Most of the sample population in both groups were female (83.3%) and Libyan (93.7) in the controls and cases, respectively. It was found that the duration of use with more than 8 hours per day is more in cases group (89%) than controls groups (3.5%).

Table1: sociodemographic characters of study participants

variable	level	Controls (200)	Cases (100)	Chi-square P
A.gender	Male female	50 150	49 50	.000
B.Marital status	Single married	200 0	85 15	.000
C.nationality	Libyan Not libyan	200 0	81 19	.003
D.smoking	Smoker Non smoker	8 192	0 100	.000
E.Chronic diseasa	Yes null	0 200	23 77	.001
F.duration] of phone use	<8hrs >8hrs	193 7	11 89	.000

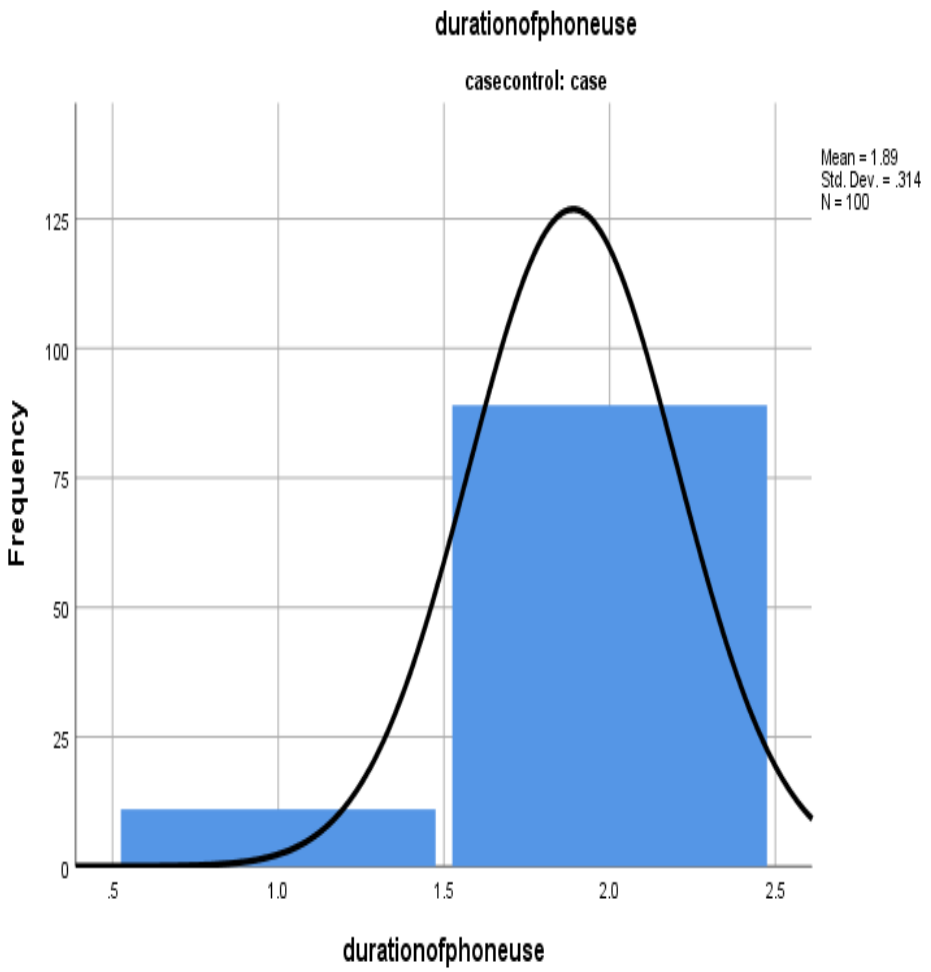
Statistics

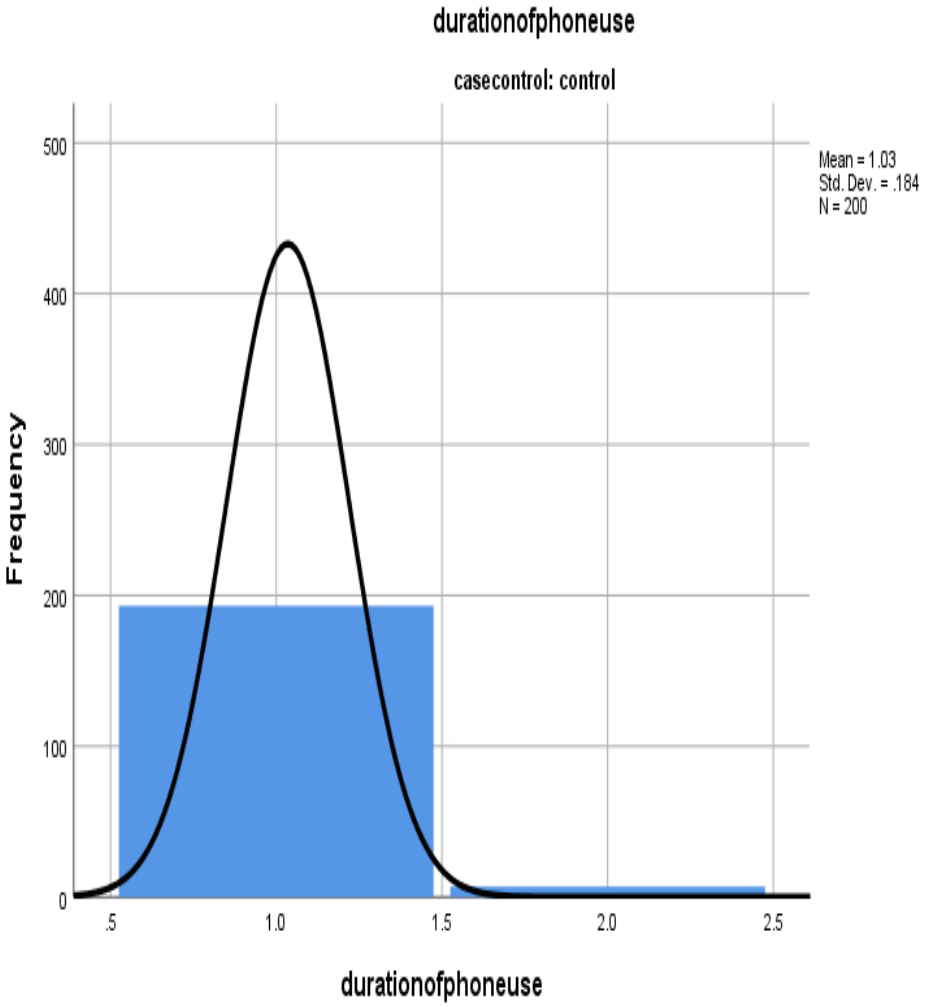
casecontrol	VAR00010			casecontrol	durationofphoneuse	sex	smoking	nationaity
case	case	N	Valid	100	100	100	100	100
			Missing	0	0	0	0	0
		Mean		1.00	1.89	2.48	2.00	2.19
		Median		.[a]	1.89[a]	2.48[a]	.[a]	2.19[a]
		Std. Deviation		.000	.314	.522	.000	.394
		Range		0	1	2	0	1
		Sum		100	189	248	200	219
		Percentiles	25	.[b]	1.39[b]	1.96[b]	.[b]	.[b,c]
			50	.	1.89	2.48	.	2.19
			75	.	.	2.99	.	2.69
			95	.	.	.	.	.
control	control	N	Valid	200	200	200	200	200
			Missing	0	0	0	0	0
		Mean		2.00	1.04	2.25	2.04	2.00
		Median		.[a]	1.04[a]	2.25[a]	2.04[a]	.[a]
		Std. Deviation		.000	.184	.434	.196	.000
		Range		0	1	1	1	0
		Sum		400	207	450	408	400
		Percentiles	25	.[b]	.[b,c]	.[b,c]	.[b,c]	.[b]
			50	.	1.04	2.25	2.04	.
			75	.	1.54	2.75	2.54	.
			95	.	1.94	.	2.94	.

a. Calculated from grouped data.

b. Percentiles are calculated from grouped data.

c. The lower bound of the first interval or the upper bound of the last interval is not known. Some percentiles are undefined.


durationofphoneuse
casecontrol: case
Mean = 1.89
Std. Dev. = .314
N = 100
Frequency
125
100
75
50
25
0
.5
1.0
1.5
2.0
2.5
durationofphoneuse


durationofphoneuse
casecontrol: control
Mean = 1.03
Std. Dev. = .184
N = 200
Frequency
500
400
300
200
100
0
.5
1.0
1.5
2.0
2.5
durationofphoneuse

Correlations

casecontrol	VAR00010			casecontrol	durationofphoneuse
case	case	casecontrol	Pearson Correlation	.[a]	.[a]
			Sig. (2-tailed)		.
			Sum of Squares and Cross-products	.000	.000
			Covariance	.000	.000
			N	100	100
		durationofphoneuse	Pearson Correlation	.[a]	1
			Sig. (2-tailed)	.	
			Sum of Squares and Cross-products	.000	9.790
			Covariance	.000	.099
			N	100	100
control	control	casecontrol	Pearson Correlation	.[a]	.[a]
			Sig. (2-tailed)		.
			Sum of Squares and Cross-products	.000	.000
			Covariance	.000	.000
			N	200	200
		durationofphoneuse	Pearson Correlation	.[a]	1
			Sig. (2-tailed)	.	
			Sum of Squares and Cross-products	.000	6.755
			Covariance	.000	.034
			N	200	200

a. Cannot be computed because at least one of the variables is constant.

VII) Discussion

in this study, the majority of the participants were female; the study has reported female sex to be a risk factor, for Women are two to three times more commonly affected by CTS than men.

We found that using smartphones for more than 8 hours per day was significantly associated with the development of CTS.

While our results showed no significant association between the number of days or years of use and the incidence of CTS, this is most likely because the majority (>95%) of the participants in both groups used smartphones more than 5 days per week and had used them for more than 3 years.

After adjusting for the risk factors (confounders), including smoking, chronic disease, we found that using a smartphone > 8 hours per day was associated with developing CTS, with an OR of 4.5 (P-value = 0.000; 95% CI 1.83-1.95).

The strength of our study is that it had an adequate sample size, and the sample population was representative. Moreover, to the best of our knowledge, no similar libya case-control study has been published. This study can increase awareness of the effects of smartphone use on the

median nerve, especially among primary care physicians, who have an important role in diagnosing and managing this condition. They should be aware of the risk factors for future development of carpal tunnel syndrome. The limitations of our study include recall bias due to the self-reporting of screen time per day by the participants, also we have difficulties to apply nerve conduction study(NCS)for all participant due to financial cost and participants.

VIII) Conclusion

Smartphone use has increased over the past decade. Studies on this problem are limited, and its relation to the development of CTS, which can be a disabling condition for patients, is unclear. This study showed that 8 or more hours per day of smartphone use was associated with the development of CTS. Furthermore, is common in females than males. Further prospective studies are needed to examine the long-term effects of smartphone use on the median nerve.

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