

Impact of Smart Phone Use on the Musculoskeletal System: A preliminary Study in Ahlia University Population

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College of Medical & Health Sciences

Dr. Dalia M Kamel Abrar Moh'd Baqer Fatima Redha

Introduction



 Touch screen is the simplest of all input devices. This simple interface is ideal for people who are not regular computer users including disable patient and elderly.



Introduction



 Touch screen device handlers are at high danger of gaining repetitive strain injuries (RSI). The repetitive text messaging affects the soft tissues due to repetitive motions.

 Upper extremity musculoskeletal problems especially the thumb have been lately stated for touch screen device users due to text messaging.



• Musculoskeletal disorders (MSDs) or (RSI)

It is conditions where there is discomforts in the neck, shoulder, low back, and elbow, hand, hip and knee, as well as multiple joints manifesting ache, tingle, swelling and pains.

Musculoskeletal risk factors



- High Task Repetition
- prolonged activities.
- Forceful Exertions
- Repetitive/Sustained Awkward Postures.
- Static posture
- Vibration
- High/ low temperature for an extended time.



 To investigate the impact of smart phones use on the distal upper extremity in terms of pain, discomfort and hand grip strength.

Material & Methods



• A 100 students (Male n = 34, Female n = 66) recruited

from Ahlia University, Bahrain.

Inclusion criteria	Exclusion criteria				
• Age: 17-30 years.	• Subjects with current injury (less				
	than six months) to the hand or upper				
• Sending at least 5 emails or text	extremity.				
messages / day.					
	• any degenerative, inflammatory,				
• Playing games or Surfing the internet	musculoskeletal or neuromuscular				
for more than 1 hour /day using the	conditions of the upper extremity or				
mobile phones.	hand affecting the use of the				
	extremity in the activities of daily				
	living.				

Outcomes



- Self-developed questionnaire collecting the demographic data.
- Cornell Mobile Phone Hand Discomfort Questionnaire (CMPHDQ).
- Special tests :
 - 1) Phalen tests, 2) Cozen's test
- 3) Froment's sign test, 4) Finkelstein test
- Hand Grip strength test .

Cornell Mobile Phone Hand Discomfort Questionnaire والمعادة CMPHDQ

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The shaded areas in the diagrams below show the During the last week how often did you If you experienced ache, pain, If you experienced ache, position of the body parts referred to in the experience ache, pain, discomfort in use of discomfort, how uncomfortable pain, discomfort, did this questionnaire. Please answer by marking the mobile phone: was this? interfere with your ability to use of mobile phone? appropriate box. Middle Ring Index Pinkie Thumb Never 1-2 3-4 Once Several Area A times times every times Slightly Moderately Verv week last last every uncomfortable uncomfortable uncomfortable Not at week day Slightly Substantially week (Shaded area) interfered interfered all Never 1-234 Once Several Complete only for times times everv times Slightly Moderately Verv Area B RIGHT HAND last uncomfortable uncomfortable last week every uncomfortable week Not at Slightly Substantially week day (Shaded area) all interfered interfered Never 1-234 Once Several times times times Slightly Moderately Very Area C every last last week uncomfortable uncomfortable uncomfortable every Not at Slightly Substantially week day week (Shaded area) all interfered interfered Never 1-2 34 Once Several Slightly Moderately Very times times every times Area D uncomfortable last last week every mcomfortable uncomfortable Not at Slightly Substantially week week day (Shaded area) all interfered interfered Never 1-234 Once Several Area E times Slightly Moderately Very times every times uncomfortable last last week every uncomfortable uncomfortable Not at Slightly Substantially week week day (Shaded area) all interfered interfered п п п п п 34 Once Never 1-2Several Area F times Slightly Moderately Very times times every last last week every uncomfortable uncomfortable uncomfortable week day Not at Slightly Substantially Tappel (Shaded area) all interfered interfered O Canal Devanity 1924

Special tests







Special tests





Hand grip strength





Results



 1- It was found 71% of participants use mobile phone more than 20 texts per day.

 2- (60%) use their right (R) hand to touch screen and (48%) to hold the mobile phone.

 3- (49%) were experiencing pain or numbness during touch screen devices use. Despite of this, 51% of them, their pain did not interfere with their activity.

Cornell Mobile Phone Hand Discomfort Questionnair (CMPHDQ)

BAHRAIN

i – Total scoring of pain and discomfort on CMPHDQ:

Area	All R Hand	All L Hand	Female R Hand	Female L Hand	Male R Hand	Male L Hand		
А	126.5	24.5	116	21.5	8.5	3		
В	73	39.5	55	26	18	13.5		
С	304.5	37.5	294	34.5	10.5	3		
D	34	34.5	37.5	21	16.5	13.5		
Е	256.5	38	213	36.5	43.5	1.5		
F	73	21.5	64.5	20	8.5	1.5		
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ii – Degree of discomfort R hand (Females)

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	Slightly discomfortable	Moderatly discomfortable	AHLIA UNIVER Very BAHRAIN discomfortable
Area (A)	9	4	1
Area (B)	5	5	0
Area (C)	9	9	2
Area (D)	2	1	1
Area (E)	12	8	1
Area (F)	4	11	0

ii- Degree of discomfort R hand (Males)

		Slightly discomfortable	Moderatly discomfortable	Very discomfortable
	Area (A)	1	1	0
	Area (B)	2	0	1
Y.	Area (C)	4	1	0
	Area (D)	2	0	1
÷	Area (E)	2	2	1
-	Area (F)	1	1	0

Special tests results of (male) subjects



	Test		Positive (Only R)	Positive (Only L)	Negative (Only R)	Negative (Only L)	total hands
	Dhalan	count	2	0	32	34	68
F	Phalen	%	2.94%	0.00%	47.06%	50.00%	100.00%
2	Finklester	count	18	13	16	21	68
F		%	26.47%	19.12%	23.53%	30.88%	100.00%
	Coronic	count	6	6	28	28	68
	cozen s	%	8.82%	8.82%	41.18%	41.18%	100.00%
	Eromontia	count	0	0	34	34	68
	-roment's	%	0.00%	0.00%	50.00%	50.00%	100.00%

Special tests results of (female) subjects:



	Test		Positive (Only R)	Positive (Only L)	Negative (Only R)	Negative (Only L)	total hands
ሲ	Dhalan	count	10	4	56	62	132
F	Phalen	%	14.71%	5.88%	82.35%	91.18%	194.1 2 %
1	Firelal a stars	count	26	15	40	51	132
Ţ	Finklester	%	38.24%	22.06%	58.82%	75.00%	194.1 2 %
î	Concerts	count	9	5	57	61	132
	cozen s	%	13.24%	7.35%	83.82%	89.71%	194.1 2 %
*		count	1	1	65	65	132
	Froment's	%	1.47%	1.47%	95.59%	95.59%	194.12%



 Subjects who showed positive results in more than one test :

		specia	Right	Left		
1	phalen	Finklesten	Cozen's		3	0
2	phalen	Finklesten			3	0
3	phalen			froment's	1	0
4		Finklesten	Cozen's		6	4
5		Finklesten		froment's	0	1



 Special test in all subjects with positive results in both hands

	Phalen		n 🦳	Finklesten		Cozen			forment			
	right	left	Both	right	left	Both	right	left	Both	right	left	Both
Total	11	4	4	43	28	14	14	11	3	1	1	0
Male	3	0	0	19	12	8	6	6	2	0	0	0
Female	8	4	4	24	16	6	8	5	1	1	1	0



Mean of hand grip strength:

	Total		М	ale	Female		
	Right	Left	Right	Left	Right	Left	
STDEV	13.01	12.57	10.64	10.12	5.43	5.23	
average	25.27	23.16	39.96	37.43	17.71	15.80	
max	72.00	65.00	72.00	65.00	35.00	35.00	
min	4.00	4.00	16.00	10.00	4.00	4.00	



1- +ve Finklestin test and high pain score of area C (thumb area) were due to:

 texting more than 20 times/day, led to myofascial pain syndrome and tendinosis of extensor pollicis longus muscle, extensor digitorum communis, thenar muscles and the first interossei muscles (Sharan et al., 2012).



- 2- Right hand Highest scores, were due to:
 - * 91% of subjects were R handed.
 - * (48%) reported holding the mobile with R hand.
 - * (60%) reported touch screen with R hand.
- * 71% flexed their R elbow while using the mobile which put this area in stressful positioning.



- Area C (thumb area) showed the highest score of pain and discomfort in female subjects than males are due to:
- During texting, <u>females had greater muscular activity</u> in the abductor pollicis longus muscle and extensor digitorum muscle compared to males.
- Females tended to have more thumb abduction and more thumb movement speeds with less stops in the thumb movement (Gustafsson et al., 2010 & Eapen, 2010).

Take home messages



• Don't use your thumb in excessive range.





Using the mobile with both hands /Texting with both

thumbs





Use some ergonomic friendly supplements ???













Hold the mobile with correct posture



Every 15- 30 minutes relax your hands



and do the following exercises.

Nerve gliding exercises





TENDON GLIDING





Thank you