Efficacy of Short-term Low Dose Oral Steroid in Carpal Tunnel Syndrome

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To determine the efficacy of four weeks course of oral steroid in the conservative treatment of idiopathic mild to moderate carpal tunnel syndrome this observational study was carried out in the department of neurology, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka from January to December 2005. A total of 60 patients with carpal tunnel syndrome were randomly divided in two treatment groups. One group of 30 patients designated as case treated with oral steroid. Initial two weeks 20 mg oral prednisolone, next two weeks 10 mg oral prednisolone with Omeprazole 20 mg twice daily for 4 weeks. Another 30 patients who were clinically and electrophysiologically as CTS treated with physiotherapy. A symptoms questionnaire was used to determine the five major symptoms of carpal tunnel syndrome (numbness, pain, weakness/clumsiness, tingling, and nocturnal awakening) on a scale of 0 (nil) to 10 (severe); The resulting global symptom score was used to evaluate the efficacy of treatment. Assessments were made at baseline and at one month. Electro-diagnosis was repeated at the end of the study to validate improvement. After treatment with short-term low dose oral prednisolone GSS improved in 56.3% and electrophysiological parameters showed significant improvement in all measured. It may be concluded that low dose short-term oral prednisolone is an effective treatment of idiopathic carpal tunnel syndrome.

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Key words: Carpal tunnel syndrome, steroids.

Introduction

Carpal tunnel syndrome (CTS) may be defined as the compression of the mediun nerve at the wrist (Carpal tunnel) in absence of an obvious injury, treatment or surgery. This is the commonest neuropathy.[1,2,3] Women are three times more likely to develop CTS than men. The commonest early symptom of CTS is the intermittent tingling paresthesia of the palmar aspect of the first three and half digits and lateral two thirds of the hand of the affected side. The dominant hand is usually affected first and produces the most severe pain.[4] As the disease progress, This tingling becomes more continuous and ultimately wasting of the thenar eminence and weakness of the grip. The known associated conditions and disease for CTS are female sex, obesity, pregnancy, and acromegaly, hypothyroidism, rheumatoid arthritis, repeated use of vibrating hand tolls, diabetes mellitus.[5]

CTS Causes a severe discomfort sleep disturbance and even economic loss by job

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disturbance. So, early diagnosis and treatment are important to avoid permanent damage of the mediun nerve. There are many therapeutic approaches for CTS. Among them some are conservative including avoiding excess use of hand, use of splint, oral steroid, local steroid, diuretics, oral pyridoxine, NSAIDS, therapy etc. It is noted that approximately 80% of patients with CTS initially responds with steroids.[1] Regarding non-conservative measures, surgery is the approach of choice, older patients and factors, such as poor mental health, significant alcohol consumption longer disease duration and male gender, poorer outcome after surgery. This study was aimed at to find a) the response of low dose short term oral steroid in mild to moderate carpal syndrome b) the improvement of pain, tingling, numbness, nocturnal awakening, weakness and clumsiness symptoms of carpal tunnel syndrome c) the improvement of NCS (Nerve conduction –study) parameters such as medium nerve motor and sensory distal latency, difference between the medium and ulnar motor and sensory distal latency of median nerve.

Methods

This was an observational study. This study was carried out in the department of neurology, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh. This study was done in one year period from January to December, 2005.

Study Population:

Case: Patient attending the out door of department of neurology, BSMMU designated as clinically suspected CTS and established by clectrophysiological parameters and treated for 4 weeks with oral steroids. Initial 2 weeks 20 mg oral prednisolone, next 2 weeks 10 mg oral prednisolone , and omeprazole 20 mg twice daily for 4 weeks.

Control: Subjects who were diagnosed clinically and ecletrophysiologically as CTS treated with physiotherapy.

Sample size: There were two groups of samples. One group of 30 patients were designated as control and another group of 30 patients designated as cases. Both the groups were match in respects do age and sex CTS symptoms for more than – 3 months.

Sample size determination: Sample size of this study was determined purposively by the researcher considering all resource constrains like limited time, financial support and availability of the study subjects.

Sampling technique: The study was conducted by using convenient type of non probability sampling technique.

Inclusion Criteria:

Clinical: a) Symptoms of CTS for more than 3 months eg. tingling numbness, b) parasthesia, nocturnal awakening, clumsiness and wasting muscle in symptomatic c) symptoms exacerbated by work d) nocturnal exacerbation of the symptoms e) positive Tinel's sign and phalen man cover f) absence of any of the exclusion criteria.

Electrophysiological: a) medium sensory distal latency more than 3.1 ms. (Millisecond) b) medium motor distal latency more than 4.4 ms. c) difference between distal motor latency of medium and ulnar nerve more than 1.1 ms. d) difference between distal sensory latency of medium and ulnar nerve more then 0.2 ms

Exclusion Criteria: a) symptoms less than 3 months b) CTS like conditions, e.g. cervical radiculopathy, proximal medium neuropathy or significant polyneuropathy c) exclusion of hypothyroidism, diabetes mellitus, pregnancy, vibrating users d) cognitive impairment interfering with subjects to follow instructions

and describe symptoms e) recent peptic ulcer and history of steroid intolerance.

Data Collection tools:
Questionnaire: Both groups of subjects were collected by structured questionnaire of five major symptoms of CTS such as a) numbness b) pain c) weakness /clumsiness d) tingling e) nocturnal awakening.

Scale: O (Nil) to 10 (Severe) - according to GSS, CTS is classified into mild, moderate and severe groups.
Mild :GSS up to 15.
Moderate : 16 - 35.
Severe : 36 – 50.

Resulting global symptoms score was evaluated. The efficacy of treatment assessment was made at baseline and at one month. Electro diagnosis was repeated at the end of the study to validate improvement.

Diagnostic Criteria for CTS:
Diagnostic criteria for CTS was set as the following a) medium sensory distal latency > 3.1 ms. b) medium motor distal latency > 4.4 ms. c) difference between distal motor latency of medium and ulnar nerve > 1.1 ms. d) diffeence between distal latency of medium and ulnar nerve >0.2 ms.

Results
Table I shows the distribution of symptoms of case and control groups before and after treatment. Tingling of the hands was found to be most common symptom being present in 93.3% in case and 96.7% in control groups. After treatment it was 60% in case and 76.7% in control groups. This was followed by before treatment in case group; numbness (90%), pain (73.3%), nocturnal awakening (60%), clumsiness (36.7%) and weakness (33.3%) and after treatment in case group; numbness (66.7%), pain (40%) nocturnal awakening 16.7%, weakness (16.7%) and clumsiness (10%). In control group it was followed by before treatment; numbness (86.7%) nocturnal awakening (63.3%), pain (63.3%), clumsiness (30%) and after treatment it was numbness (63.3%), pain (50%), nocturnal awakening (50%), clumsiness (16.7%) and weakness (6.7%).

Table II shows the global symptoms score of both hands in case and control groups. Their comparison and significant of difference are also given. Analysis shows that there was significant percent chance from before to after treatment (right side case 56.98% and control 30.66% left side: Cases 54.3% and control 25.72%) with P-value of <0.001 in both case and control groups which were significant.

Table III shows the MN MDL and MN SDL of both hands in case and control groups. Their comparison and significance of difference are also given. Analysis shows that there was significant percent chance from before to after treatment (MN - MDL- right side; case 10.68% and control 4.9%; Left side – case –10.43% and control 10.26%), MN - SDL - right side case 13.98 % and control 5.30%; Left side case12.01% and control 4.45%).

Table IV shows the difference between the MN – MDL and UN MDL of both hands in case and control groups. Their comparison and significance of differences are also given. Analysis shows that there was significant percent change from before to after treatment (right side : case –30.22% and control 5.6%; Left side – case 29.28 and control 7.28%) with P value of < 0.001 in both case and control groups which were significant.

Table VI shows the significance between MN SDL and UN SDL of both hands in case and control groups. Their comparison and significance of difference are also given. Analysis shows that there was significant

percent chance from before to alter treatment (right side case 26.27% and control 9.62%; Left side; cases 29.2% and control 9.17% with p- value of <0.001 in both case and control group a which were significant .

Table I: Symptoms of the subjects before and after treatment.

	Case (N=30				Control (N=30)			
	Before treatment		After treatment		Before treatment		After treatment	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)
Pain	22	(73.3)	12	(40.0)	19	(63.3)	15	(50.0)
Tingling	28	(93.3)	18	(60.0)	29	(96.7)	23	(46.7)
Numbness	27	(90.0)	20	(66.7)	26	(86.7)	19	(63.3)
Nocturnal awakening	18	(60)	5	(16.7)	20	(66.7)	15	(50.0)
Weakness	10	(33.3)	5	(16.7)	6	(20.0)	2	(6.7)
Clumsiness	11	(36.7)	3	(10.0)	9	(30.0)	5	(16.7)

Table II: Treatment response on global symptom score in case (N=30) and control (N=30) groups

	Global symptom score		Percent(%)chance from before treatment –10 after treatment	P- value
	Before treatment (Mean ± SD)	After treatment (Mean ± SD)		
Right limb			56.98	< 0.001
Case	18.83± 5.22	7.67± 2.22		
Control	19.27 ± 3.46	13.33± 2.59	30.66	<0 .001
Left limb				
Case	17.87 ± 6.91	7.00 ± 2.85	54.30	<0 .001
Control	16.50 ± 7.26	11.57± 7.26	25.72	<0.001

Paired students '+' test
*** = Significant.

Table III: Treatment response on nerve conduction study – MN-MDL and MN-SDL of both upper limbs in case

Nerve conduction study Before treatment Parameters (Mean ± SD)	After treatment (Mean ± SD)	Percent (%) chance from before treatment to after treatment	P- value
MN MDL (ms)			
Right			
Case 5.18± .47	4.61± .34	10.68	<0 .001
Control 5.16 ± .32	4.91± .35	4.90	<0 .001
Left			
Case 4.97 ± 0.71	4.44 ± .62	10.43	< 0.001
Control 4.75 ± 0.92	4.70± .52	10.26	>0.5

(N=30) and control (N=30) groups.
MN MDL (ms)

Nerve condition study Before treatment Parameters(Mean ± SD)	After treatment (Mean ± SD)	Percent (%) chance from before treatment –10 after treatment	P- value
Right			
Case 3.86± .27	3.31± 0.19	13.98	<0 .001
Control 3.89 ± 0.17	3.68± .20	5.30	<0 .001
Left			
Case 3.69 ± 0.34	3.23 ± 0.19	12.01	<0 .001
Control 3.64 ± 0.38	3.47± .33	4.45	<0.001

Paired Students "+" test
*** = Significant.

Table IV: Treatment response on nerve conduction study difference between MN – MDL and UN MDL of both upper limbs in case-(N=30) and control (N=30) groups

Difference between MN MDL and UN MDL(ms)	Nerve condition study Before treatment Parameters(Mean ± SD)	After treatment (Mean ± SD)	Percent (%) chance from before treatment to after treatment	P- value
Right				
Case	2.53 ± .64	1.71± .46	30.22	< 0.001
Control	2.54 ± .48	2.39± .49	5.60	<0 .01
Left				
Case	2.22 ± .77	1.59 ± .49	29.28	<0 .001
Control	2.26 ± .66	2.09± .62	7.28	<0.001

Paired Students "+" test
/ * = Significant.

Table V: Treatment response on nerve conduction study- difference between MN SDL and UN SDL of both upper limbs in case (N=30) and control (N=30) groups

Difference between MN MDL and UN MDL(ms)	Nerve condition study Before treatment (Mean ± SD)	After treatment (Mean ± SD)	Percent(%)chance from before treatment to after treatment	P- value
Right				
Case	1.83 ± 0.79	1.36± .82	26.21	<0 .001
Control	1.82 ± .44	1.65± .44	9.62	< 0.001
Left				
Case	1.50 ± .60	1.05 ± .42	29.20	<0 .001
Control	1.52 ± .62	1.26± .56	9.18	<0.001

Paired Students "+" test
/ * = Significant.
Paired students '+' test
*** = Significant.

Discussion

This was a hospital-based study and was carried outs to see whether the low dose steroid is effective in the treatment of carpal tunnel syndrome. The study subjects were taken from the department of Neurology (Outdoor and the patients refereed to neurophysiology center for electrophysiological testing in the department of Neurology BSMMU, Dhaka. Age, sex and socioeconomic status matched respondents of same number were also taken as control. There were 30 cases and 30 control CTS cases included in this series.

Table I of this study shows that most common symptoms of CTS was tingling of the hand; in case, it was 93.3% and control 96.7%. After treatment it was 60% in case and 76.7% in control 76.7% in control. This result is quite consistent with that of the study done by [7] Campos (2004). Next common presenting symptoms were numbness (90%) pain (73.3%), Nocturnal awakening (60%), clumsiness (36.7%) and weakness (33.3%) in case group and after treatment it was numbness (66.7%), pain (40%), nocturnal awakening (16.7%) weakness (16.7%), clumsiness (10%), presenting symptoms of control group before treatment were numbness (87.7%), pain (63.3%), Nocturnal awakening (66.7%), clumsiness (38%) and weakness (20%) and after treatment it was (63.3%), pain(50%), Nocturnal awakening 50%, clumsiness (16.7%) and weakness(6.7%) similar studies showed significant important of pain numbness, nocturnal awakening score after low dose oral steroid .[7]

This study shows that the global symptoms score (GSS) had significant percent change from before to after 4 week treatment with low dose oral prednisolone(right case-56.3%, cnotrol-30.66%) Left case- 56.3%, control 25.72%). Similar studies showed that the GSS improved in 66%.[7,8] The difference between this study and those of above studies may be due to small number of study population.

Our study shows that the MN-MDL and MN_SDL had significant percent change from before to after treatment (MN- MDL- right side case –10.68% and control-4.9%; Left side cases-10.43% and control 10.26%); Mn- SDL right side cases –13.98% and

control 5.30%; Left side cases 12.01%, control-4.45%). This observation suggest that prednisolone is effective in mild to moderate CTS patients similar studies showed significant improvement of MN-MDL and MN-SDL in 4 weeks prednisolone group.[7,8]

The present study shows that the difference between the MN- MDL and UN-MDL; MN-SDL and UN-SDL of both hands in case and control groups there was significant percent change from before to after treatment similar studies showed significant improvement of eclectrophysiological parameters.[8,9]

Studies are effective at reducing swelling on account of their anti-inflammatory action considering all the above observations it is established that this study showed that oral steroid (prednisolone) in the treatment oral mild to moderate carpal tunnel syndrome is effective.

Conclusions

It may be concluded that low dose short term oral prednisolone is an effective treatment of idiopathic carpal tunnel syndrome. But this study has some limitations ie regarding long term efficacy of oral steroid treatment remains uncertain.

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