



CODEN [USA]: IAJ PBB

ISSN: 2349-7750

INDO AMERICAN JOURNAL OF PHARMACEUTICAL SCIENCES

<http://doi.org/10.5281/zenodo.3601289>

Available online at: <http://www.iajps.com>

Research Article

EFFECT OF BOTULINUM TOXIN AND TASK SPECIFIC TRAINING ON QUALITY OF LIFE IN POST STROKE FOCAL HAND DYSTONIA

Muhammad Umar¹, Naveed Babur², Irfan Afzal Mughal³, Mazhar Badshah⁴, Mirza Shamim Baig⁵

¹Head Of Physiotherapy Department, Holy Family Hospital, Rawalpindi, ²Professor, Isra Institute of Rehabilitation Sciences, Isra University, Islamabad, ³Assistant Professor, Department Of Physiology HBS Medical and Dental College, Islamabad, ⁴Professor of Neurology, Pakistan Institute of Rehabilitation Sciences, Islamabad, ⁵Associate Professor, Isra Institute of Rehabilitation Sciences, Isra University, Islamabad.

Article Received: November 2019 **Accepted:** December 2019 **Published:** January 2020

Abstract:

***Objective:** To find the impact of Botulinum toxin type A and task specific training in improving the quality of life of patients with post stroke focal dystonia of upper limb and to determine the association of quality of life with hand dystonia and functional outcomes.*

***Study Design:** Quasi experimental study*

***Place & Duration:** Physiotherapy department Holy Family Hospital Rawalpindi, Chambeli Rehabilitation Center Rawalpindi and The Neurocounsel Islamabad from October 2015 to December 2016.*

***Methodology:** A total of 23 patients fulfilling the inclusion and exclusion criteria were recruited using purposive sampling. All patients enrolled in the study were injected with Botulinum toxin type A followed by task specific training. Patients were evaluated at baseline, week 4 and week 8 using; Arm dystonia disability Scale, Fugl-Meyer Assessment scale of upper limb and Stroke specific quality of life scale.*

***Results:** The mean age of the study population was 43.57±10.94 years, with 71.4 % (n= 15) of male and 28.6 % (n=6) females. There was an improvement in severity of dystonia from baseline to week 8 after the interventions, hand functions also improved. The mean scores of SS-QOL and FMA-UL also showed significant differences over the time period as shown by repeated measures ANOVA (P value <0.001).*

***Conclusion:** Botulinum toxin type A when provided with task specific training, not only improved the dystonia but also improved the functions of the upper limb, which in returns improved the quality of life of patients presenting with post stroke focal hand dystonia.*

Keywords: Botulinum toxin type A, Dystonia, Quality of Life, Stroke, Physiotherapy, Task specific training.

Corresponding author:

Muhammad Umar,

Head Of Physiotherapy Department, Holy Family Hospital, Rawalpindi,

E.mail: physioumar@gmail.com,

QR code



Please cite this article in press Muhammad Umar et al., *Effect Of Botulinum Toxin And Task Specific Training On Quality Of Life In Post Stroke Focal Hand Dystonia.*, Indo Am. J. P. Sci, 2020; 07(01).

INTRODUCTION:

Stroke, a very common neurological disorder, has increased the trends of morbidity and mortality all around the globe. Pakistan is also affected from it and being a developing country the incidence of stroke is higher. Though the exact statistics are deficient but it is estimated to affect 350,000 new cases every year. The presence of risk factors of stroke among almost every fourth individual like; diabetes, hypertension or cardiovascular disease has made people more prone to stroke in Pakistan. [1] As in our country the health systems are not that strong so almost two third of the population have to bear their own expenses for getting health care for their diseases. [2] In developing countries which have poor support system for their people any long term illness, especially the one which makes them dependent physically as well as financially, the burden is increased manifold. So the stroke not only affects the individuals or family but it also affects the community.[3] The effects of stroke can range from physical to psychological as well as social and have a very bad impact on the sufferer and family. [4]

A stroke sufferer gets many complications and disorders depending on the location of insult, area involved as well as the collateral blood supply. These post stroke complications and disorders make the daily livings activities much more difficult for the patient. Among these disorders the movement disorders are of prime importance which presents themselves at different stages of stroke depending on the area involved. They can be hypokinetic or hyperkinetic.[5] Among the hyperkinetic movement disorders, dystonia is a prevalent movement disorder, it can present itself in many different forms like focal, segmental or general dystonia.[6] The focal hand dystonia affects both agonist and an antagonist muscle groups of hand and forearm, causing involuntary contractions and repetitive motions and as well as fixed postures. [7, 8] When a stroke patient gets this movement disorder the problems are increased manifold and quality of life is further deteriorated.

Different interventions have been applied for treating focal dystonia of hand, such as; Anticholinergics, dopamine depletors, baclofen, intrathecal baclofen, Selective peripheral denervation, surgical ablative procedures, bilateral pallidal stimulation, pallidotomy, neuro stimulation, deep brain stimulation and Botulinum Toxin. [9-14] Similarly the use of supportive therapies is also found in literature like splinting, immobilization in cast, kinesio taping, electrical stimulation, stretching and strengthening exercises, Constraint induced movement

therapy and task specific trainings, but not much work has been done to measure the quality of life of these patients.[15-18] The objectives of current study was to find the impact of BTX-A and TST in improving quality of life of patients with upper limb post stroke focal dystonia and to determine the association of quality of life with hand dystonia and functional outcomes.

METHODOLOGY:

A quasi experimental single group study was carried out in Physiotherapy department Holy Family Hospital Rawalpindi, Chambeli Rehabilitation center Rawalpindi and The Neurocounsel Islamabad on a total of 23 patients. The study was registered under ClinicalTrials.gov ID: NCT03664375. The approval was taken before conducting the research from; Advance studies and research committee Isra University, Islamabad campus, Institutional Research Forum Rawalpindi Medical College & Allied Hospitals, The Neurocounsel and Chambeli Institute Rawalpindi. Total study duration was of fourteen months i.e from October 2015 to December 2016. Purposive sampling was used to recruit patients in the study. The inclusion criteria comprised of patients having focal dystonia secondary to stroke in upper limb and reduced functions of upper limb because of it. The patients included were having their first attack of stroke atleast six months before and having no previous treatment with botulinum toxin in the last 3 months were included in the study. The pregnant females, patients having previous treatment with botulinum toxin and any other condition which can interfere with the rehabilitation process like fixed contractures or neuropathies were excluded from the study. After proper consent from patients the participants were injected with Botulinum toxin type A, which was followed by task specific training a specially designed regime of Physiotherapy. One hour session of physiotherapy with the designed exercise plan was given to all patients up to 8 weeks, with a frequency of three times per week. All the patients were evaluated at baseline for their performance using Arm dystonia disability Scale (ADDS), Fugl-Meyer Assessment scale for upper limb (FMA-UL) and they also reported their quality of life using Stroke specific quality of life scale (SS-QOL). All the patients were reassessed using the same scale at 4th and 8th week of intervention. There were two drop outs from the study so at the end data for 21 patients was evaluated.

Data Analysis:

The data was analyzed using SPSS 21. Normality of data was checked by Shapiro Wilk test and found to be normally distributed i.e. P value >0.05 for all

variables so tests of choice were parametric tests. To analyze the data for mean differences, from week 0 to week 8, repeated measures Anova was used. The correlation between all the scales was found using Pearson and Spearman's rho correlation depending upon the variable.

RESULTS:

The mean age of the study population was calculated as 43.57 ± 10.94 years, with 71.4 % (n= 15) of male

and 28.6 % (n=6) females. Most of the patients were having their right side affected 81 % (n=17) and 19 % (n=4) were having the left side involved. Almost 38.1 % (n=8) of patients in the study were affected from hemorrhagic whereas the rest were having the ischemic stroke. There was an improvement in the severity of dystonia from baseline to week 8 after the application of the treatment protocol for 8 weeks. Frequency of dystonia before and after intervention up to week 8 is depicted in table I.

TABLE I: FREQUENCY OF DYSTONIA FROM BASELINE TO WEEK 8

ADDS	Base line	4 weeks	8 weeks
0	0	0	1(4.8%)
1	2(9.5%)	4(19%)	9(42.9%)
2	10(47.6%)	11(52.4%)	7(33.3%)
3	9(42.9%)	6 (28.6%)	4(19%)

When mean scores of SS-QOL and FMA-UL were compared at baseline , week 4 and week 8, significant differences were found over the time period by repeated measures ANOVA (P value <0.001) (table II).

TABLE II: REPEATED MEASURES ANOVA SHOWING MEAN SCORES OF FMA-UL AND SS-QOL FROM BASELINE TO WEEK 8

Variable	Base Line Mean \pm SD	Wk 4 Mean \pm SD	Wk 8 Mean \pm SD	F Value	P Value
FMA-UL	33.67 \pm 7.74	36.24 \pm 7.64	40.19 \pm 8.69	26.84	<0.001 ***
SSQOL	100.43 \pm 21.74	121.57 \pm 25.92	150.95 \pm 38.13	56.49	<0.001 ***

The correlation coefficient was checked using Pearson correlation for FMA-UL and SS-QOL. Spearman's rho test was used for ADDS and FMA-UL and SS-QoL. A significant negative correlation was found for ADDS with FMA-UL and SS-QoL i.e.

(P < 0.001) and positive correlation was found between FMA-UL and SS-QoL (P value <0.001) at all stages including baseline, after 4 weeks, 8 weeks of intervention. (table III)

TABLE III: Correlation between ADDS and FMA-UL and SS-QOL and FMA-UL and SS-QOL at baseline, week 4 and after 8 weeks.

Correlation	Correlation Coefficient	P value
ADDS and FMA-UL at baseline	-0.871	<0.001 ***
ADDS and FMA-UL at week 4	-0.707	<0.001 ***
ADDS and FMA-UL at week 8	-0.689	<0.001 ***
ADDS and SS-QOL at baseline	-0.858	<0.001 ***
ADDS and SS-QOL at week 4	-0.813	<0.001 ***
ADDS and SS-QOL at week 8	-0.841	<0.001 ***
FMA-UL & SSQOL at baseline	0.836**	<0.001 ***
FMA-UL & SSQOL at week 4	0.706**	<0.001 ***
FMA-UL & SSQOL at week 8	0.776**	<0.001 ***

DISCUSSION:

In the studied population of present study marked improvements were found in quality of life as well as in functions of hand when intervention was provided in combination using BTX-A and TST. The results of the current study are consistent with the findings from previous studies. Cloud et al did a review explaining various treatment strategies for different types of dystonias and focal hand dystonia was one of them. They explained the mechanism of botulinum toxin action and reported it to block the excessive uncoordinated contraction of muscles by reducing the quantity of acetylcholine on neuromuscular junction. In addition, they reported effectiveness of different physiotherapy and occupational therapy treatment options for focal hand dystonia.[14] In current study both botulinum toxin and physical therapy treatment options were used and they improved the upper limb function in patients with post stroke focal hand dystonia.

Thanganatt et al. in their review recommended conservative measurements for treating this focal dystonia of hand dystonia before surgical treatment. They provided recommendations for sensory retraining exercises, limb immobilization, biofeedback, electrical nerve stimulation (EMS) and deep brain stimulation (DBS). Botulinum toxin in addition was also recommended in their study for its treatment. [18] Our study provided two different treatment options; botulinum toxin and physiotherapy in combination and reported marked improvements in the patients presenting with focal hand dystonia after stroke.

Dystonia is responsible for causing impairment in different functions of daily living with the occurrence of depression and anxiety. This affects all domains of quality of life. A study comparing health related QOL measures among various types of dystonia reported both depression and anxiety among the most significant predictor of poorer health related quality

of life in patients with three different types of focal dystonia namely; cervical dystonia, blepharospasm, and writer's cramp. When the patient is unable to perform the normal function from the affected part he develops severe depression and anxiety ultimately decreasing the quality of life of the patient. [19]

A study by Lin et al determined the effectiveness of TST for treating upper limb dysfunctions following stroke. Fugl-Meyer Assessment scale was used to determine the function of the upper limb. Marked improvements were noted in FMA-UE along with quality of life[20]. In the current study, although treatment was provided in combination with botulinum toxin but positive results have been found regarding quality of life and hand function.

The effects of botulinum toxin on impairment, activity participation and quality of life was determined by Caty et al. in post stroke patients and their results showed positive effects on tone but little or no effect on QOL in patients with focal dystonia of hand[21]. The results of current study showed improved quality of life in dystonic patients that might be attributed to the addition of task specific training used in the current treatment regimen.

As patient becomes more independent in ADLs, the quality of life of patient shows improvement in their functions [22]. That might be the reason for improved quality of life in post stroke patients presenting with focal hand dystonia in the current study.

Lack of long followup to determine the exact effects on upper limb after weaning of botulinum effects, single group study design, unequal male and female ratio are the few limitations of the study that must be addressed in the future studies. In addition, separate effects of bootulinum toxin and task specific training should be determined on post stroke focal hand dystonia.

CONCLUSION:

Botulinum toxin type A provided with physiotherapy, not only improved the dystonia but also improved the functions of the affected part, which in returns improved the quality of life of patients presenting with post stroke focal hand dystonia.

Disclaimer:

This research is part of a PhD project done at Isra Institute of Rehabilitation Sciences, Isra University, Islamabad.

Conflict of Interest: Author declared no conflict of interest.

Source of Funding: No funding source.

Author's contribution:

Muhammad Umar: Literature review, Designed research methodology, Conceived idea, Data collection, Data analysis, Data interpretation, Manuscript writing.

Naveed Babur: Designed methodology, Data interpretation, Manuscript writing, Approval.

Irfan Afzal Mughal: Designed methodology, Data analysis

Mazhar Badshah : Conceived idea, Data collection.

Mirza Shamim Baig: Designed research methodology, Conceived idea, Data analysis, Final approval.

REFERNCES:

1. Khalid, W., et al., *Quality of life after stroke in Pakistan*. BMC neurology, 2016. **16**(1): p. 250.
2. Nishtar, S., et al., *Pakistan's health system: performance and prospects after the 18th Constitutional Amendment*. The Lancet, 2013. **381**(9884): p. 2193-2206.
3. Rathore, F.A., P.W. New, and A. Iftikhar, *A report on disability and rehabilitation medicine in Pakistan: past, present, and future directions*. Archives of physical medicine and rehabilitation, 2011. **92**(1): p. 161-166.
4. Abubakar, S. and S. Isezuo, *Health related quality of life of stroke survivors: experience of a stroke unit*. International journal of biomedical science: IJBS, 2012. **8**(3): p. 183.
5. Bansil, S., et al., *Movement disorders after stroke in adults: a review*. Tremor and other hyperkinetic movements, 2012. **2**.
6. Mueller, J., et al., *Pallidal deep brain stimulation improves quality of life in segmental and generalized dystonia: Results from a prospective,*

- randomized sham-controlled trial*. Movement Disorders, 2008. **23**(1): p. 131-134.
7. Liow, N.Y.-K., et al., *Gabapentin can significantly improve dystonia severity and quality of life in children*. european journal of paediatric neurology, 2016. **20**(1): p. 100-107.
8. Balint, B., et al., *Dystonia*. Nature Reviews Disease Primers, 2018. **4**(1): p. 25.
9. Jankovic, J., *Treatment of dystonia*. The Lancet Neurology, 2006. **5**(10): p. 864-872.
10. Vercueil, L., et al., *Deep brain stimulation in the treatment of severe dystonia*. Journal of neurology, 2001. **248**(8): p. 695-700.
11. Brin, M.F., et al., *Localized injections of botulinum toxin for the treatment of focal dystonia and hemifacial spasm*. Movement disorders: official journal of the Movement Disorder Society, 1987. **2**(4): p. 237-254.
12. Tomaselli, M., et al., *Focal Dystonia and Botulinum Toxin: Our Experience with IncobotulinumtoxinA*. NeuroQuantology, 2019. **17**(3).
13. Elkaim, L.M., et al., *Deep brain stimulation for pediatric dystonia: a meta-analysis with individual participant data*. Developmental Medicine & Child Neurology, 2019. **61**(1): p. 49-56.
14. 14. Cloud, L.J. and H. Jinnah, *Treatment strategies for dystonia*. Expert opinion on pharmacotherapy, 2010. **11**(1): p. 5-15.
15. 15. van den Dool, J., et al., *Long-term specialized physical therapy in cervical dystonia: outcomes of a randomized controlled trial*. Archives of physical medicine and rehabilitation, 2019.
16. 16. Tibussek, D., et al., *Post stroke hemidystonia in children: a neglected area of research*. Molecular and cellular pediatrics, 2015. **2**(1): p. 14.
17. 17. Priori, A., et al., *Limb immobilization for the treatment of focal occupational dystonia*. Neurology, 2001. **57**(3): p. 405-409.
18. 18. Thenganatt, M.A. and J. Jankovic, *Treatment of dystonia*. Neurotherapeutics, 2014. **11**(1): p. 139-152.
19. 19. Moraru, E., et al., *Relation between depression and anxiety in dystonic patients: implications for clinical management*. Depress Anxiety, 2002. **16**(3): p. 100-3.
20. 20. Lin, K.-c., et al., *Effects of constraint-induced therapy versus bilateral arm training on motor performance, daily functions, and quality of life in stroke survivors*. Neurorehabilitation and Neural Repair, 2009. **23**(5): p. 441-448.
21. 21. Caty, G.D., et al., *Effect of upper limb botulinum toxin injections on impairment,*

- activity, participation, and quality of life among stroke patients.* Stroke, 2009. **40**(7): p. 2589-2591.
22. Kim, K., Y.M. Kim, and E.K. Kim, *Correlation between the activities of daily living of stroke patients in a community setting and their quality of life.* Journal of physical therapy science, 2014. **26**(3): p. 417-419.