Original Research Article

IS THE UNAFFECTED SIDE OF STROKE PATIENTS ACTUALLY NORMAL?

Soumiya Selvarajan 1, Gajanan Bhalerao *2, Ashok K. Shyam 3, Parag Sancheti 4.

1 B.P. Th, Sancheti Institute College of Physiotherapy, Pune, Maharashtra, India.
2 M.P. Th, Sancheti Institute College of Physiotherapy, Pune, Maharashtra, India.
3 MS Ortho, Research Officer- Sancheti Institute for Orthopedics and Rehabilitation, Pune, Maharashtra, India.
4 MS Ortho, Chairman- Sancheti Institute for Orthopedics and Rehabilitation, Pune, Maharashtra, India.

Objective: The aim of the study was to find how affected is the unaffected side of stroke population.

Methods: 20 participants were recruited who met the inclusion criteria of more than 3-month first time unilateral both male and female stroke patients of age group 40-60 years were assessed and evaluated for the 3 parameters using grip dynamometer, peg board and reaction time machine respectively and compared it to the normal healthy age, gender and dominance matched individuals.

Results: The unaffected side of stroke patients was significantly affected in gross motor strength, fine motor dexterity, reaction time audio and visual when compared to normal population.

Conclusion: There are significant motor deficits seen in the unaffected side of stroke patients.

KEY WORDS: Hemiplegia, Gross Motor Strength, Fine Motor Strength, Reaction Time.

ABSTRACT

INTRODUCTION

Address for correspondence: Dr. Gajanan Bhalerao, Sancheti Institute College of Physiotherapy, Shivaji Nagar, Pune-5, Maharashtra, India. E-Mail: gajanan-_bhalerao@yahoo.com

Stroke is a disease that affects the arteries leading to and within the brain. It is the fourth leading cause of death and a leading cause of disability. A stroke occurs when a part of the brain cannot get the blood it needs because of the blood supply being blocked or ruptured and so the brain cells die. As brain is an extremely complex organ that controls various body functions. If a stroke occurs in the region that controls a body function won’t work as it should. However, because one side of the brain controls the opposite side of the body, a stroke affecting one side will result in neurological complications on the side of the body it affects [1]. Many researchers have conducted studies on the affected side of the body and established the fact. Whereas very few of us know that there are sensorimotor deficits seen in the non-affected side of the body as well.

Motor deficits after stroke are often evident on the side of the body that is contralateral to the side of brain damage. There is increasing evidence, however, that motor performance of the upper extremity (UE) on the side ipsilateral...
A unilateral cerebral hemispheric stroke rarely produces ipsilateral gestural disturbances, and these are less obvious than the contralateral ones. However, Pohl et al [2], Yelnik et al [3] showed that patients with parietal lesions have many ipsilateral motor disturbances since then. Most of the tasks used in our daily life, requires a certain reaction time, rhythm or speed. Thus, simple and complex visual-motor reaction times increase in cases of both right and left ipsilateral hemispheric lesion [4-6] while the left hemisphere seems to be dominant in studies of reaction time during multiple-choice task.

The need of the study was to identify the motor control deficits of the unaffected side in stroke patients when compared to normal healthy age matched individuals and to emphasize on effective and efficient rehabilitation of stroke patients of both the sides.

**METHODOLOGY**

The study was initiated following the approval of Institutional Review Board. Purposeful Sampling was done. Inclusion criteria was patients with first time unilateral cerebral stroke more than 3 months of age ranging from 40-60 years both male and female patients. Exclusion criteria was patients with hemineglect hemianopia and apraxia which were ruled out with few tests. 40 subjects (20 hemiplegic (stroke) and 20 healthy individuals age sex and dominance matched individuals) were recruited. The subjects were recruited through purposive sampling. Subjects meeting the inclusion criteria were evaluated to show no important visual perceptual deficits (minimum score of 24/36 on the Motor Free Visual Perceptual Test [7-9] and a minimum score of 26/35 on the Bell Test [10] to eliminate the presence of visual hemineglect), and show no important cognitive deficits (minimum result of 80/100 on the Modified Mini-Mental State Examination [11-13] they were explained about the research and consent was taken for the same. Subjects of healthy population were recruited by matching age, gender, dominance of stroke population and were consented about the research and all three parameters was assessed in the same way and values were recorded.

**RESULTS**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Normal</th>
<th>Stroke</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fine motor dexterity</td>
<td>24.35 (±1.41)</td>
<td>19.9 (±1.41)</td>
<td>0</td>
</tr>
<tr>
<td>Gross motor strength</td>
<td>23.85</td>
<td>20.2 (±4.24)</td>
<td>0</td>
</tr>
<tr>
<td>Reaction time visual</td>
<td>1.63(±0.49)</td>
<td>2.74 (±0.46)</td>
<td>0</td>
</tr>
<tr>
<td>Reaction time auditory</td>
<td>2.17(±0.56)</td>
<td>2.36 (±0.33)</td>
<td>0</td>
</tr>
</tbody>
</table>

**DISCUSSION**

Significant difference was observed between the two groups for gross motor, fine motor and reaction time. The sensorimotor deficits observed in the unaffected extremities can be considered due to disruption of output from the damaged hemisphere [18].

It is possible that a lesion in one hemisphere resulting from a vascular cause interrupts corticobulbar and corticoreticular projections and consequently affects subcortical structures.
involved in motor control [19]. Therefore, the integrity of these descending pathways is necessary to achieve motor performance on the unaffected side.

However, the other view can be that the reduction of motor inhibition expressed as of the unmasking of inhibited pathways rather than a sign of restorative change to compensate for the motor deficit [20]. That this abnormal motor inhibition may be non-specific is suggested by the fact that it did not correlate with the different degree of motor involvement between patients. The findings agree with the previous studies [20,21], which showed that the presence of ipsilateral motor evoked potentials after stimulation of the unaffected hemisphere was associated with poor motor outcome. Patients with good motor recovery showed a dramatic decrease in excitability over the unaffected hemisphere with a return to normal inhibition values and the persistence of an abnormal excitability over the affected hemisphere. The presence of abnormal excitability over the unaffected hemisphere was associated with poor motor recovery [22].

It is also possible that the weakness on the paretic side interferes with the performance of movement on the unaffected side. For reaction time the nature of this task being complex involves both hemispheres as great sensorimotor interaction is needed. In healthy controls, involvement of ipsilateral motor areas is greater with more complex movements. The increased involvement of ipsilateral premotor cortex in simple movements of an impaired limb could just reflect the relative difficulty of such movements. The timing of the interference effects of ipsilateral motor cortex during the simple task in patients is like that observed for the more complex task reaction time in healthy controls [19].

Involvement of ipsilateral motor cortex was greatest in the more impaired patients. Therefore, the present results cannot be interpreted as showing that the undamaged premotor cortex is functionally substituting for the injured contralateral motor system in a complete and simple way. Although greater injury produces greater impairment, it also provokes a greater adaptive response. Although increased use of ipsilateral motor cortex does not enable complete recovery in the most impaired patients, it is likely that it enables greater recovery than would have been possible otherwise [23].

Few studies even showed that patients with good motor recovery showed a dramatic decrease in excitability over the unaffected hemisphere with a return to normal inhibition values and the persistence of an abnormal excitability over the affected hemisphere. The presence of abnormal excitability over the unaffected hemisphere was associated with poor motor recovery [23].

The motor areas of the hand muscles of both hemispheres are abnormally reduced in the early period after stroke and depends on the functional recovery. The main finding is that the unaffected hemisphere showed a return to normal values in patients with significant motor recovery, while it remained abnormal in the unaffected hemisphere in patients with poor motor recovery [23]. Hence it is important to emphasize on rehabilitation of both sides in a stroke patient.

CONCLUSION

This study concludes that there are significant motor control deficits on the unaffected side of stroke patients when compared to normal healthy age, gender and dominance matched individuals.

ACKNOWLEDGEMENTS

We would take this opportunity to thank Mrs. Dhara Kapoor and Mrs. Rachana Dabadghav - Research co-ordinator for their support and guidance. I extend my gratitude to all teachers, my friends and participants of this study who voluntarily participated in the study.

Conflicts of interest: None

REFERENCES


How to cite this article: