ORIGINAL RESEARCH PAPER

Medical Science

# EFFICACY OF WHEELCHAIR SKILLS TRAINING IN COMMUNITY BASED MANUAL WHEELCHAIR USERS WITH PHYSICAL DISABILITIES AND ITS IMPACT ON QUALITY OF LIFE

**KEY WORDS:** Physical Disabilities, Manual Wheelchair, Wheelchair Skills Training, Quality of life.

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**ABSTRACT**

The study evaluated immediate effects of Wheelchair Skills Training Program in Community Based Manual Wheelchair Skills users with Physical disabilities which had its impact on Quality of Life. 41 Manual Wheelchair users with physical disabilities who had little experience of wheelchair use but did not receive training were included in the study. Subjects were administered for Wheelchair Skills Test Questionnaire (Version 4.3) and WHOQOL-BREF Pre and Post Training. Subjects were trained for basic and intermediate level skills. Basic level training had huge impact on quality of life and wheelchair skills of applicable subjects. On the other hand, intermediate level training helps respective subjects enhance their scores in all the skills, thereby improving quality of life than that of prior to training.

## INTRODUCTION

Wheelchair is one of the most commonly used assistive devices in Physically Challenged individuals. Appropriate provision of wheelchairs is most important in the successful rehabilitation of people who need a wheelchair for mobility. A study in India revealed that 60% of wheelchair users who had received donated wheelchairs stopped using them owing to discomfort and the unsuitability of the wheelchair design for the environment in which it was used.

To function independently, manual wheelchair users must possess a variety of wheelchair skills, enabling them to deal with the physical barriers they will inevitably encounter in various environments.

Mastering wheelchair skills can make the difference between dependence and independence in daily life. Training of these skills is therefore a vital part of the rehabilitation process. Up to 36% of wheelchair users reported that obstacles such as curbs, uneven terrain (e.g., grass, mud, ice), door handles, flooring surfaces, and thresholds were barriers to mobility. Specific training of wheelchair skills may help overcome some or all of these barriers for selected persons. To address these problems, efforts have been made to improve accessibility, wheelchair design, and the wheelchair-delivery process. Increasingly, attention is being paid to wheelchair skills training as an important component of these efforts.

The Wheelchair Skills Training Program (WSTP) was developed as a means of formalizing such training. **Kirby (2009)** developed Wheelchair Skills Training Program (WSTP) and Wheelchair Skills Test (WST) which have been applied to adult population.

Studies have shown effectiveness of the WSTP during initial rehabilitation of wheelchair users **(MacPhee, 2004)[5],** for community wheelchair users **(Best, 2005)[1],** and for Occupational Therapy students **(Coolenl, 2004)[2].**Manual wheelchair skill performance of persons with Physical Disabilities is positively associated to participation.

The purpose of this study was to give Wheelchair skills training program to community manual wheelchair users with physical disabilities and to know its impact on Quality of Life.

## AIMS AND OBJECTIVES

1) To determine the effect of wheelchair skills training program on improving wheelchair skills in community manual wheelchair users with physical disabilities
2) To assess the Quality of Life in community manual wheelchair users with physical disabilities
3) To Enhance Participation and improve the Quality of life of manual wheelchair users with physical disabilities after giving them wheelchair skills training program.

### Hypothesis

Null Hypothesis (H0): There will be no significant effect of wheelchair skills training program on improvement of wheel chair skills in community manual wheelchair users with physical disabilities.

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Alternate Hypothesis (H1): There will be significant effect of wheelchair skills training program on improvement of wheel chair skills in community manual wheelchair users with physical disabilities.

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## MATERIALS AND METHODS

The study was an Experimental study in which 41 patients fulfilling the inclusion criteria participated. The duration of study was of 14 months with a training period of 8 days.

### Inclusion Criteria

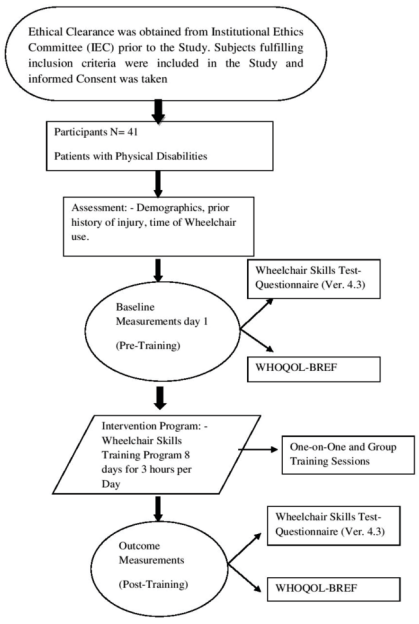
1) Clinically diagnosed subjects with physical disabilities with stable medical condition
2) Age group between 20 to 55 years
3) Both male and female subjects
4) Subjects using manual wheelchairs
5) Subjects who had not received wheelchair skill training program
6) Are able to give informed consent

### Exclusion Criteria

1) Subjects who are unable to push their manual wheelchair actively
2) Have an upper extremity injury

**Procedure**

**Flowchart:** Showing the Procedure of the Study




**Intervention**

**Table 1:- Showing Wheelchair Skills Intervention**

| Intervention- Wheelchair Skills Training Program for Basic & Intermediate Wheelchair Skills | | | |
|---|---|---|---|
| Sr No. | Skills | Skill Level | Rationale |
| 1 | Rolls Forward Short Distance | Basic | Simulate moving about indoors or while crossing two-lane |
| 2 | Rolls Backwards Short Distance | Basic | While Ascending an incline using foot propulsion |
| 3 | Turns in Place | Basic | To move the wheelchair in confined space |
| 4 | Turns while moving forwards | Basic | To avoid obstacles or to change direction |
| 5 | Turns while moving backwards | Basic | |
| 6 | Maneuvers Sidways | Basic | To get closer of farther from the objects (e.g, bed, toilet) |
| 7 | Reaches high object | Basic | Necessary for reaching to the light switch, cupboard |
| 8 | Picks objects from floor | Basic | Necessary for picking up light, heavy objects from the floor |
| 9 | Relieves weight from buttocks | Basic | For comfort & prevention of pressure sores |
| 10 | Operates body positioning options | Basic | Pressure relief, enhance breathing, postural control, reduce edema, reduce spasticity, stability, facilitate bladder management |
| 11 | Level transfer | Basic | For day-to-day activities (e.g, wheelchair to bed, toilet, car, tub etc.) |
| 12 | Folds and unfolds wheelchair | Intermediate | For transport or Storage |
| 13 | Gets through hinged door | Intermediate | For ease of accessibility through gates or doors |
| 14 | Rolls longer distance | Intermediate | To get around in the community |
| 15 | Avoids moving obstacles | Intermediate | To avoid Injury |
| 16 | Ascends slight incline | Intermediate | Frequently encountered in natural or built environment |
| 17 | Descends slight incline | Intermediate | |
| 18 | Rolls across side slope | Intermediate | |
| 19 | Rolls on soft surface | Intermediate | To roll on carpet, sand, dirt, grass, gravel & snow) |
| 20 | Gets over threshold | Intermediate | To pop casters over obstacles |
| 21 | Gets over gap | Intermediate | E.g. a water channel or a space between a subway platform and the subway train |
| 22 | Ascends low curb | Intermediate | E.g. curbs, steps, home entries, uneven sidewalk sections |
| 23 | Descends low curb | Intermediate | |

**Figures: Showing Wheelchair Skill Training Program**

**Fig 1: Ascends Slight Incline**

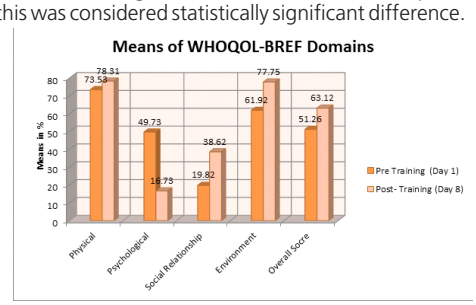
**Fig 2: Turns to Left**

**Fig 3: Maneuvers Sideways**

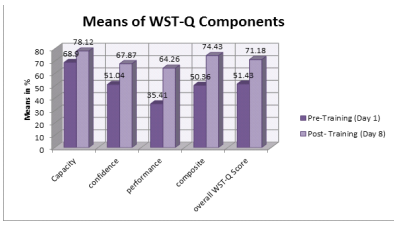
**Fig 4: Rolls Forward Short Distance**

**RESULTS**

Pre and Post Training readings were evaluated on the two Outcome Measurements viz, Wheelchair Skills Test- Questionnaire (WST-Q Version 4.3) and WHOQOL and were compared using Paired't' test. Results were presented as Mean and Standard Deviation. Level of Significance was set at 99.9% i.e p=0.001, less than this was considered statistically significant difference.




**Graph I:** Means of All the four domains and Overall Domain Score of WHOQOL-BREF Pre and Post Training




**Graph II:- Means of All the Components and Overall Scores of WST-Q Pre and Post Training**

**Table 2: Showing improvement in Basic Skills of the Subjects in Both the Outcome Measures Pre and Post Training**

| OUTCOME MEASURE COMPONENTS | BASIC SKILLS SUBJECTS IMPROVEMENT | | | |
|---|---|---|---|---|
| | Pre | Post | Mean Difference | Improvement % |
| **WHOQOL-BREF** | | | | |
| PHYSICAL | 65.26% | 70.52% | 5.26% | 8.06% |
| PSYCHOLOGICAL | 39.35% | 47.17% | 7.83% | 19.89% |
| SOCIAL RELATIONSHIP | 16.09% | 36.43% | 20.35% | 126.49% |
| ENVIRONMENT | 57.96% | 76.09% | 18.13% | 31.28% |
| OVERALL SCORE | 44.66% | 57.55% | 12.89% | 28.86% |
| **WST-Q** | | | | |
| CAPACITY | 56.96% | 71.22% | 14.26% | 25.04% |
| CONFIDENCE | 36.65% | 57.09% | 20.43% | 55.75% |
| PERFORMANCE | 32.87% | 63.48% | 30.61% | 93.12% |
| COMPOSITE | 42.04% | 73.00% | 30.96% | 73.63% |
| OVERALL SCORE | 42.13% | 66.20% | 24.07% | 57.12% |

**Table 3:- Showing improvement in Intermediate Skills of the Subjects in Both the Outcome Measures Pre and Post Training**

| Outcome Measure Components | Intermediate Skills | | | |
|---|---|---|---|---|
| | Pre | Post | Mean Difference | Improvement % |
| **WHOQOL-BREF** | | | | |
| PHYSICAL | 84.11% | 88.28% | 4.17% | 4.95% |
| PSYCHOLOGICAL | 63.00% | 71.39% | 8.39% | 13.32% |
| SOCIAL RELATIONSHIP | 24.61% | 41.39% | 16.78% | 68.17% |
| ENVIRONMENT | 67.00% | 79.89% | 12.89% | 19.24% |
| OVERALL SCORE | 59.68% | 70.24% | 10.56% | 17.69% |
| **WST-Q** | | | | |
| CAPACITY | 84.17% | 86.94% | 2.78% | 3.30% |
| CONFIDENCE | 69.44% | 81.67% | 12.22% | 17.60% |
| PERFORMANCE | 38.67% | 65.28% | 26.61% | 68.82% |
| COMPOSITE | 61.00% | 76.28% | 15.28% | 25.05% |
| OVERALL SCORE | 63.32% | 77.54% | 14.22% | 22.46% |

**Table 4:- Showing improvement in Overall Skills of the Subjects in Both the Outcome Measures Pre and Post Training**

| Outcome Measure Components | OVERALL | | | |
|---|---|---|---|---|
| | Pre | Post | Mean Difference | Improvement % |
| **WHOQOL-BREF** | | | | |
| PHYSICAL | 73.54% | 78.32% | 4.78% | 6.50% |
| PSYCHOLOGICAL | 49.73% | 57.80% | 8.07% | 16.23% |
| SOCIAL RELATIONSHIP | 19.83% | 38.61% | 18.78% | 94.71% |
| ENVIRONMENT | 61.93% | 77.76% | 15.83% | 25.56% |
| OVERALL SCORE | 51.26% | 63.12% | 11.87% | 23.15% |
| **WST-Q** | | | | |
| CAPACITY | 68.90% | 78.12% | 9.22% | 13.38% |
| CONFIDENCE | 51.05% | 67.88% | 16.83% | 32.97% |
| PERFORMANCE | 35.41% | 64.27% | 28.85% | 81.47% |
| COMPOSITE | 50.37% | 74.44% | 24.07% | 47.80% |
| OVERALL SCORE | 51.43% | 71.18% | 19.74% | 38.39% |

## DISCUSSION

The study was carried out to find "Efficacy of Wheelchair Skills Training Program" in community based manual wheelchair users with physical disabilities and its impact on quality of life. The objective of study was achieved corroborating the hypothesis that "Wheelchair Skills Training Program" improves wheel chair skills as well as quality of life.

**Graph I** shows significant improvement in all the domains of **WHOQOL-BREF** pre training to post training. Physical Domain was significantly improved in the following areas like able to get around, sleep, ability to perform your daily activities, capacity for work. It also improved Physical pain making sure that wheelchair is not used in hazardous or painful way. Psychological Domain showed improvement pre to post training in thinking capacity as far as daily activities, community access & bodily appearance are concerned. This improvement in the Psychological domain may be due to group therapy sessions where they had an opportunity to interact with other participants in the group with similar conditions. Improvement in the Social Relationship was a result of improved Physical & Psychological Domain that helped to improve positivity between his/her relatives. There was a feeling of positivity i.e self-worth, self-dependant and increase in self-esteem. Improvement in the Environment Domain of the Subjects had increased their confidence to access in the community, transport and satisfaction of being independent & safe.

The Overall Score of WHOQOL-BREF shows that Wheelchair Skills Training Program had significant improvement in all the Domain of Quality of life. The effect of wheelchair skill performance on participation using WHOQOL-BREF has never been studied. **Olga Kilkens**[6] in her study used SIPSOC score to measure participation and found that SIPSOC score was moderately related to all three Wheelchair Circuit scores.

**Graph No II** shows significant improvement in All the Components of **Wheelchair Skills Test- Questionnaire (WST-Q)** pre to post training. This study Correlated with the study done by **Worobey L et.al**[7]. Improvement in the Performance sub score was found to be higher from pre training to post training (i.e 35.41 to 64.26 with a mean difference of 28.83%) which could be due to the cumulative effects of Capacity and Confidence components. The structured program with blocked practice moving from simple to complex skills provided the participants to gain mastery over the task **(Coolen).** Thus the results of earlier studies and this study confirm that a period of structured wheel chair skill training is beneficial.

In this study, subjects were trained for basic and intermediate level skills. More than 50% of the subjects were required to be trained with maximum focus on basic skills of Wheelchair which are required for day to day activities. Basic skills like turns in place, turns while moving forward and backward, maneuvers sideways, Reaches high object etc were part of this training as they are essential for access in the community as well as for doing day to day work. These skills improved to a greater extent because prior to the training subjects were using poor body mechanics and had very little knowledge about proper technique of applying force. This resulted in wastage of energy, very little improvement in movement which added to psychological frustration of subject and his/her relatives. Post-training subjects were able to access with the wheelchair freely with proper techniques, which helped them to save energy and improved their confidence as well.

Also, in the study Group Therapy sessions were given to the subjects which provided encouragement and feedback to each of the participant in the group which increase their motivation to participate in the training session. This also led to learning of new skills to a greater extent with a competitive psychology.

**Table No. 2** shows improvement in outcome measures due to **basic skills training**. Subjects chosen for wheelchair training skills had very less prior experience of wheelchair use. Study shows that there is significant improvement in all measures of both WHOQOL-BREF and WST-Q tests. While Physical and Psychological measures

of WHOQOL-BREF showed 8.06% and 19.89% improvement over pre-training scores, Environment measure showed 31.28% improvement. It could be concluded that the cumulative effect was reflected in Social Relationship measure which showed sharp improvement from 16.09% pre-training to 36.43% post training score. This is improvement of 126.49% over the pre-training score. Similarly, Capacity and Confidence measures of WST-Q showed significant growth of 25.04% and 55.75% respectively. Here, Performance measure showed sharp improvement from 32.87% pre-training to 63.48% post-training which is improvement of 93.12% over pre-training score.

**Table No. 3** shows improvement in outcome measures due to **intermediate skills training**. Subjects able to perform basic skills had proceeded to intermediate level training. Study shows that even for intermediate level training, there is significant improvement in all measures of both WHOQOL-BREF and WST-Q tests. While Physical and Psychological measures of WHOQOL-BREF showed 4.95% and 13.32% improvement over pre-training scores, Environment measure showed 19.24% improvement. Similar to basic skills results, intermediate skills results also suggest that the cumulative effect of these improvements reflected in Social Relationship measure which showed sharp improvement from 24.61% pre-training to 41.39% post training score. This is an improvement of 68.17% over the pre-training score. Similarly, Capacity and Confidence measures of WST-Q showed growth of 3.30% and 17.60% respectively. Here, Performance measure showed significant improvement from 38.67% pre-training to 65.28% post-training which is improvement of 68.82% over pre-training score.

## CONCLUSION

The study evaluated immediate effects of Wheelchair Skills Training Program in Community Based Manual Wheelchair Skills users with Physical disabilities and its impact on Quality of Life. Both basic and intermediate level skills training showed significant effect on quality of life and wheelchair skills on the subjects studied.. Study showed that basic level training has huge impact on quality of life and wheelchair skills of applicable subjects. On the other hand, intermediate level training helps respective subjects enhance their scores in all the skills, thereby improving quality of life than that of prior to training. Thus, the training program is statistically significant for both levels of skills. Thus, it can be concluded from analysis of the results that wheelchair skills training enhance participation of community manual wheelchair users in day-to-day activities which has its impact on their quality of life. Thus, the study rejects Null Hypothesis.

### Limitations

1. Study was Single group experimental study
2. Disability Percentage was not considered
3. Specific Diagnosis was not considered
4. The study was of very short duration of 8 days
5. Follow up was not considered

### Future Recommendations

1. Advanced level skills training shall give better understanding of improvement and functional level of patient
2. WST can be studied on other conditions such as specific type of disabilities.
3. A comparative study can give more better results of WSTP

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