Management of Medial Epicondylitis in a High-School Quarterback: A Case Report

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INTRODUCTION

Physical therapy continues to be the primary aspect of recovery from epicondylitis Although there is little research looking at the use of eccentric exercise for medial epicondylitis, the efficacy of eccentric exercises to treat various tendinopathies including lateral epicondylitis have been clearly shown in the literature. This case report will help to shed light on evidence based treatment methods used to treat medial epicondylitis, specifically in an adolescent overhead throwing athlete, an area where little research exists. This case will examine some of the methods recommended by experts in the field.

METHODS

Case Description

History

A 16-year-old, right-hand dominant male American football quarterback was referred for outpatient physical therapy after experiencing pain in his right elbow for 3 weeks following repetitive throwing during spring football.

Examination

- **Special Tests**
  - Elbow valgus stress test: NEGATIVE
  - Moving valgus stress test: NEGATIVE
  - Golfer's Elbow test: POSITIVE

Evaluation

- Upon completion of the examination, it was noted that the patient had slightly decreased strength and pain with palpation of medial epicondyle, proximal forearm musculature and pain in the medial forearm with activity. At the activity level, the patient had some difficulty with carrying/lifting in ADL's at home. At the participation level, the patient was unable to participate in football activities and throw and partially limited in participating in strength training.

Diagnosis

- Medical: Based on the patient's history and physical therapy examination, we diagnosed the patient with medial epicondylitis.
- Physical Therapy**: Pattern 4D:** Impaired Joint Mobility, Motor Function, Muscle Performance, and Range of Motion Associated With Connective Tissue Dysfunction.

Prognosis

According to the APTA's Guide to Physical Therapist Practice, the expected number of visit for practice pattern 4D ranges from, 3 to 36 visits. The patient was seen two to three times per week for 6 weeks for a total of 18 visits including the initial evaluation and the discharge. According to the literature on this diagnosis, the average number of visits was 12±6 with projected time frame of 2-3 visits per week for 6 weeks.

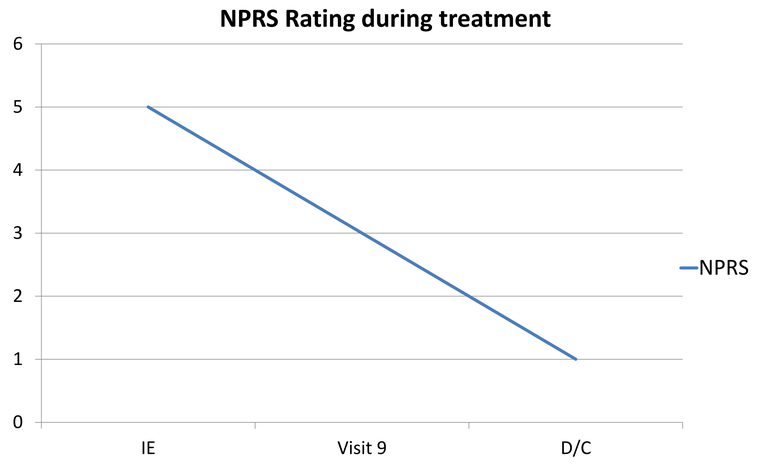
Interventions

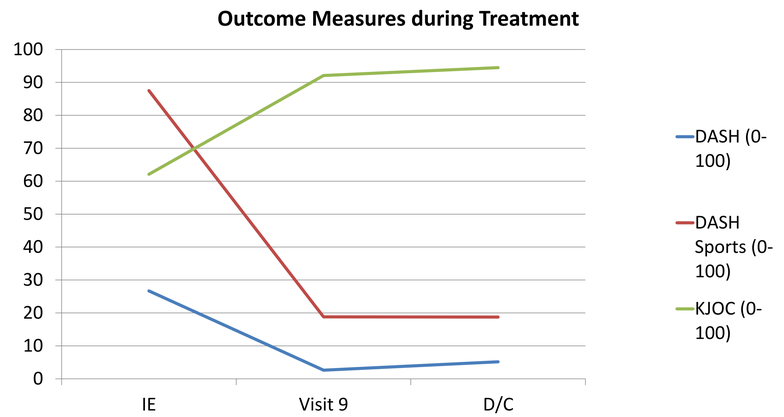
Interventions chosen should focus on improving ROM, increasing motor function and muscle performance, and decreasing inflammation. The patient's plan of care was divided into three phases Phase I consisted of shoulder girdle strengthening with scapular stabilization and ROM exercise for the wrist and forearm; Phase II consisted of exercises to build endurance and strengthen the forearm flexor-pronator mass; Phase III was based around increasing the tendon loading and progressing to return to sport participation.

Treatment Phase	Key Interventions
Phase I (Shoulder Girdle & Scapular Strengthening, Wrist/Forearm ROM & Pain Reduction)	ER @ 90 degrees, IR 0 deg., Scaption/ER, Wrist flexor stretching, proximal Radioulnar joint mobs, STM to forearm flexor mass, Prone I,T,Y, W's.
Phase II (Increase Strength & Endurance of forearm flexor-pronator musculature)	Plank with push-up plus, CLX theraband dual vector w/ ER, Wrist flexion with dumbbell, eccentric wrist flexion w/ DB, Eccentric wrist flexion with FlexBar, Body Blade ER/IR, STM to forearm flexor mass.
Phase III (Increase Tendon loading and progress to Return To Play)	Eccentric wrist flexion w/ Flexbar, Eccentric wrist flexion w/ DB, BodyBlade at 90/90 ER/IR, Sport Cord football throw, Half Kneeling throwing deceleration, Football interval throwing.

RESULTS / OUTCOMES

At the 7th visit, Phase II scores decreased from 26.7 to 6.0 in the DASH and from 87.5 to 25.0 in the Sports module showing a decrease in the patient's symptoms. The KJOC score increase from 62.1 at initial examination to 72.0 indicating that the patient was progressing well. At discharge, visit 18, the DASH score was determined to be 4.3 with the Sports module slightly decreasing to 18.7. The patient's KJOC score increased to 94.5, indicating a high level of function. The NPRS, a self reported pain measure (0= no pain; 10= Worst pain) decreased from 5 at initial exam to 1 at Discharge.





DISCUSSION

The patient examined in this case study demonstrated greater decreases in pain and also a lower DASH score at discharge compared to those older and less active patients in the Svernlov and Tyler studies. The factors of age and activity level appear to be important in decreasing a patient's symptoms. The pain score decrease exceeded the MCID of 2 and the DASH score decreased more than the MCID of 10.2. Thus, the changes were clinically meaningful. The KJOC showed a plateau towards end of treatment so the DASH may be the best instrument to use, however the KJOC contains more specific questions in regards to sports participation. Further research is recommended to examine these outcome measures for use with young athletes.

CONCLUSION

The results of this case study deliver low level evidence that the use of eccentric exercise and a number of other exercise interventions may be beneficial in reducing pain and increasing function in patients presenting with medial epicondylitis, in this case, a young adolescent throwing athlete.

Characteristics of Patients with Adhesive Capsulitis: A Retrospective Case Review

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Background

Frozen shoulder, also known as adhesive capsulitis of the shoulder, is a disorder characterized by painful loss of shoulder range of motion that is not attributed to changes in the cartilage and bone of the shoulder joint. It is thought that the deficiencies in shoulder motion are due to the development of dense adhesions and capsular thickening of the muscles and tendons of the rotator cuff.[1] While a lot is known about the presentation of frozen shoulder, the actual trigger of the disorder is still somewhat of a mystery. Studies have reviewed the correlation of age, gender, medications, other conditions (diabetes, thyroid disease), and other factors with the occurrence of frozen shoulder. Some correlations to these factors are present; however there still is no exact mechanism of causation seen across all cases. A less investigated factor that has the potential to affect the occurrence of frozen shoulder is menopause. It is known that frozen shoulder occurs most often in patients between the ages of 40-60 [2] which also happens to be the age range that most women experience menopause.[3] Therefore, the goal of this current study is to look at characteristics, specifically related to menopausal status, present in patients who present with adhesive capsulitis in order to gain insight into the causative factors of this condition.

Purpose

To investigate a potential link between menopausal status and the occurrence of adhesive capsulitis by analyzing the characteristics of patients (men and women) presenting with adhesive capsulitis at a local physical therapy clinic. We believe we will find similarities between the patients who have been treated at PEAK Rehabilitation Clinic for Adhesive Capsulitis that will benefit the future research of the underlying physiological cause of this condition.

Methods

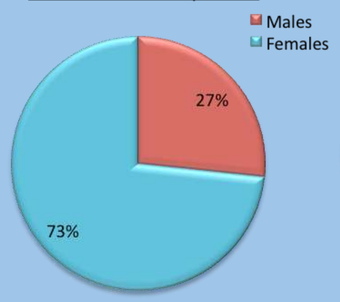
We performed a retrospective study of patients (men and women) who presented with signs and symptoms consistent with adhesive capsulitis (Frozen Shoulder) at a local physical therapy clinic. To do this, we reviewed physical therapy charts of patients from 2010-2015 at PEAK Rehabilitation Clinic in Augusta, GA and pulled the charts of patient's with a PT diagnosis of Adhesive capsulitis. 105 charts were collected and we compared each patient's specific characteristics including: age, past medical history, medications, surgical history, duration of symptoms, and length of treatment to attempt to identify any significant trends. We then performed frequency counts and ran several chi-square tests of the collected data to determine similarities and significant trends among these patient characteristics and their diagnosis of adhesive capsulitis.

Results

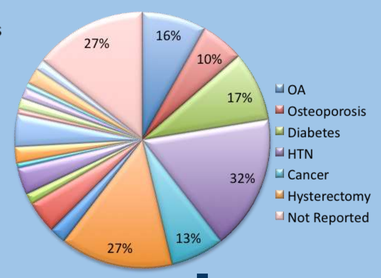
Characteristic	Variable	Percentage of Total	Effect Size	Chi-Square p Value
Female Age	50-59 years	44.16%	18.6	0.0000000006
	60-69 years	31.17%	8.6	
Male Age	60-69 years	35.71%	4.40	0.0497
	50-59 years	28.57%	2.40	
Female Past Medical History	HTN	32%	17.65	0.0000000000000000006
	Hysterectomy	27%	13.65	
	Diabetes	17%	5.65	
Male Past Medical History	HTN	43%	7.917	0.0000053
	Diabetes	39%	6.917	
Female Medications	NSAID	47%	20.257	0.0000000000008893
	HRT	39%	14.375	
Male Medications	Blood Pressure	16%	6.571	0.000349
	Diabetes and NSAIDs (tied)	13%	4.571	

Characteristic	Variable	Percentage of Total	Effect Size	Chi-Square p Value
Female Age	50-59 years	44.16%	18.6	0.0000000006
Female Duration of Symptoms	0 to 3 Months	54.55%	26.6	0.0000000000009
	4 to 6 months	19.48%	-0.4	
Male Duration of Symptoms	4 to 6 months	46.43%	7.4	0.005859
	0 to 3 months	21.43%	0.4	
Female Duration of Treatment	0 to 4 weeks	40.26%	11.75	0.0003588
	5 to 8 weeks	33.77%	6.75	
Male Duration of Treatment	0 to 4 weeks	50%	7	0.006466
	9 to 12 weeks	25%	0	
Female Surgical Region	Abdominal	29%	12.9	0.0032369
	Reproductive	32.5%	8.9	
Male Surgical Region	Abdominal	32.14%	2.875	0.060188
	Head	28.57%	1.875	

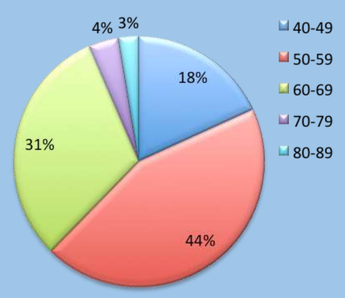
Females vs Males Presenting with Adhesive Capsulitis



Female Past Medical History



Female Age Distribution



Limitations

This study has several limitations that should be addressed in further research studies. The main limitation is the lack of a control group to compare our 105 subjects to. By having this control group, the researchers could then determine that the trends noticed among the adhesive capsulitis subjects were not occurring just by chance and are, in fact, statistically significant. A second limitation is the lack of reliable past medical history, surgical history, and medication list. All of the information used for this study was collected from subjective patient report. Therefore, the information collected would be more reliable and valid if the researchers had access to actual patient charts from their primary care physicians rather than using self-report questionnaires. A final limitation is the lack of information in regards to menopausal status for the female subjects. There were no questions on the past medical history form that addressed menopausal status. Due to this lack of information, the researchers had to make assumptions on menopausal status based on age, surgical history, and medications. These limitations do not make the results of this study invalid; however, by addressing these limitations in further research studies it will help to strengthen the conclusions that have been made by the researchers.

Discussion

In support of the previous literature, we found that women were more likely to present than men with adhesive capsulitis. Of our 105 subjects, 73.33% were women. Of the women include in our study, 44.16% were between the ages of 50-59. The statistical significance of the majority of our female subjects ranging from 50-59 relates to the previous study by Juel and Natvig, who noted a peak prevalence of adhesive capsulitis during the same age range in another cohort study comparing males to females.[4] Another main finding from our study was found within the analysis of our subjects' past medical history. Hypertension was the most prevalent diagnosis listed in past medical history for both men and women at 43% and 32%, respectively. A history of having a hysterectomy was the second most common past medical history item for women at 27% followed by diabetes at 17%. Diabetes being fairly prevalent in the female population, as well as the second most common diagnosis for males (39%), was consistent with the previous literature in regards to the relationship between diabetes and adhesive capsulitis. [5] In regards to medications taken by our subjects, contrary to our previous research, 47% of the females were using some sort of NSAID at the time of their physical therapy evaluation, followed by 39% who were on some sort of hormone replacement therapy for various diagnoses. There currently is little research investigating the relationship between NSAIDs or hormone replacement therapy and adhesive capsulitis.

Conclusion

Due to some limitations in the study, no direct link between Adhesive Capsulitis and menopausal status was able to be determined. However, significant trends found in the data support future research regarding the likelihood of this relationship. Of the charts analyzed there was a significantly higher incidence of adhesive capsulitis in women aged 50-59, a frequent occurrence of hysterectomies, and a common use of hormone replacement therapy among the women. Future research including a control group, more adequate medical history, and blood sampling should be completed to further investigate these characteristics and the physiological link between menopausal status and adhesive capsulitis.

References:
1. Kisner C, Colby LA. The shoulder and shoulder girdle. In: Biblis MM, ed. *Therapeutic exercise* 6th ed. Philadelphia, PA: F.A. Davis Company 2012:539-610.
2. Juel NG, Natvig B. Shoulder diagnoses in secondary care, a one year cohort. *BMC Musculoskelet. Disord.* 2014;15:89.
3. Krailo MD, Pike MC. Estimation of the distribution of age at natural menopause from prevalence data. *Am. J. Epidemiol.* Mar 1983;117(3):356-361.
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5. Milgrom C, Novack V, Weil Y, Jaber S, Radeva-Petrova DR, Finestone A. Risk factors for idiopathic frozen shoulder. *Isr. Med. Assoc. J.* May 2008;10(5):361-364.

Postural Adaptations to Incline Stance in Subjects with Cerebellar Disorder

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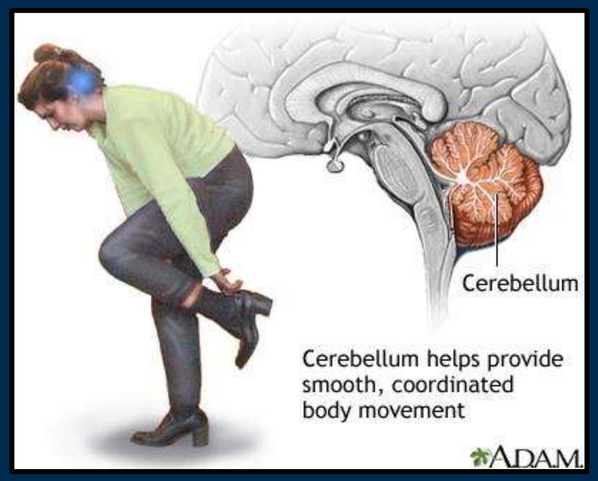
Introduction

- Previous studies have looked at the postural response to standing on an incline to determine an individual's preferred reference frame for postural control (Kluzik, Horak, & Peterka, 2005)
- Upon returning to vertical following 2.5 minutes of 5° toes-up incline stance, healthy subjects exhibited a wide array of postural responses, demonstrating variability among individuals of preferred reference frames (Kluzik, Horak, & Peterka, 2005)
- The cerebellum influences postural control via the somatosensory branch by receiving proprioceptive information from the limbs and trunk and sends information to the motor cortex to adjust movements. Cerebellar disorder may therefore impede this process and impair postural control
- The purpose of the current study was to determine if cerebellar disorder impairs the processing of somatosensory inputs for postural orientation, thereby affecting the expression of the lean aftereffects following prolonged stance on an incline



Methods

Subjects

ID	Age (yr)	Sex	Dur (yr)	P&G	Sev.	Diagnosis
1	24	m	9	18	2	SCA-3
2	50	m	10	14	1	ataxia (unknown etiology)
3	52	m	10	4	0.5	SCA-2
4	52	m	2	11	1	cerebellar deg.
5	55	f	11	7	1	cerebellar deg.
Mean	47		8	11	1	
SD	13		4	6	0.5	

- Additionally, 5 age-matched controls (3 M; 2 F) participated in the study, Their mean age was 49 +/- 14

Methods (cont'd)

Procedure

- Subjects were informed of the protocol and performed a practice round
- Participants stood in the NeuroCom (Figure 1) with eyes open for 30 seconds on a level surface while baseline force data was obtained
- Participants were blindfold and a 5° toes-up incline board was placed under their feet. They stood in this position for 3 minutes. No data was collected during this period
- After the 3 minute period, the incline board was removed and the subject then stood upright for another three minutes, blindfolded, while force data was collected (Figure 2)

Figure 1

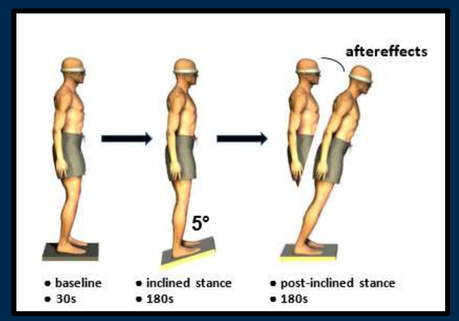
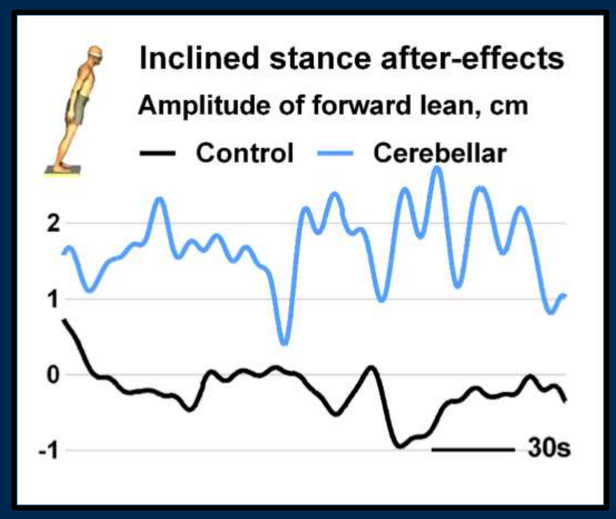


Figure 2

Results

Effect of inclined stance on aftereffects

- Four out of the five subjects in each group displayed the forward lean aftereffects (80% responder rate): χ^2 (1) = 0.0, p = 1.0
- The amplitude of sway at the beginning and end of the post-incline stance was similar between the group: The initial postural lean was 0.25 ± 0.9 cm in the Control group compared to 2 ± 4.3 cm in the Cerebellar group
- Postural lean at the end was 0.1 ± 0.9 cm in the Control group and 1.3 ± 3 cm in the Cerebellar group, p = 0.23 in both cases
- The similarity in postural adaptation also produced a similar range of A/P sway: 1 ± 0.8 cm in the Control group and 1.4 ± 0.6 cm in the Cerebellar group, p = 0.27



Results (cont'd)

Variability of postural sway

- A/P sway variability during the 30-s quiet baseline stance was similar between the groups, 0.2 cm in the Control group versus 0.3 cm in the Cerebellar group, p = .26
- In the post-incline stance phase, subjects in the Cerebellar group showed significantly large fluctuations in postural sway (Figure 3)
- Sway variability was two times higher in the Cerebellar group: 1.1 cm compared to 0.5 cm in the Control group, p = .0295

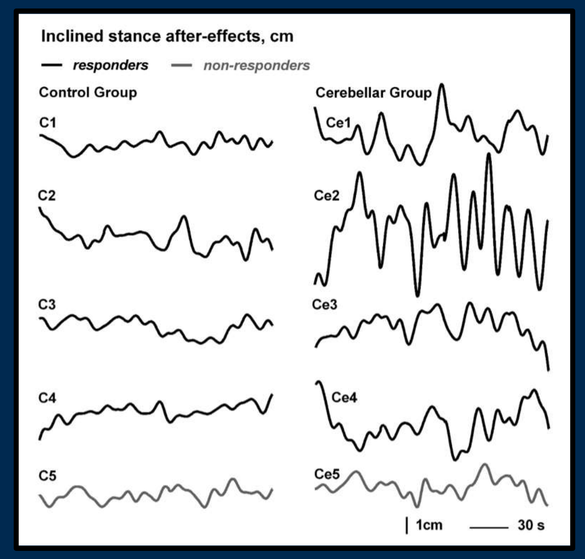


Figure 3

Discussion & Conclusion

- Inclined stance significantly affected post-inclined stance sway response in the Cerebellar group
- The subject who did not show the forward lean had two differential characteristics: an unspecified cerebellar ataxia diagnosis and a relatively short disease duration, which may explain the unspecificity
- These findings support the hypothesis that the presence of a cerebellar diagnosis impairs the processing of somatosensory inputs for postural control (although adaptation appears to be intact)
- Areas for further research include: similar testing with subjects grouped according to type of cerebellar degeneration and/or disease duration, the introduction of a visual field during the post-incline stance period to assess the effect of vision on post-incline lean, and stepping during the incline phase to assess the impact of muscle and joint receptors on the postural response

References

- Kluzik, J., Horak, F., & Peterka, R. (2005). Differences in preferred reference frames for postural orientation shown by after-effects of stance on an inclined surface. Experimental Brain Research, 162(4), 474-489. doi: 10.1007/s00221-004-2124-6

Balance and Postural Control Responses to Platform Perturbations in Cerebellar Degeneration with Light Touch Intervention

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Introduction

- In cerebellar degeneration, the cerebellum progressively shrinks and becomes less able to perform the necessary regulatory processes for which it is responsible
- Previous studies have found that subjects with cerebellar dysfunction have continuous and marked hypermetric responses in postural gain
- This study looked at reactive balance both with and without the use of a light touch intervention to examine the cerebellum's role and the effects of proprioceptive inputs from the body in gain control of postural responses to body displacement
- Postural gain from the tibialis anterior and gastrocnemius muscles are examined following platform perturbations, as they are typically first to respond to platform perturbations and are easily measured
- Our hypothesis is that light touch (as a form of somatosensory augmentation) will not be effective in improving balance and postural control responses to platform perturbations in those with cerebellar disorders

Methods

Participants

- Subjects with cerebellar disorder: 5 (4 M, 1 F)
- Control (healthy) subjects: 5 (3 M, 2 F); Average age 49 yr

ID	Age (yr)	Sex	Dur (yr)	P&G	Sev	Diagnosis
1	24	M	9	18	2	SCA-3
2	50	M	10	14	1	Ataxia (unknown etiology)
3	52	M	10	4	0.5	SCA-2
4	52	M	2	11	1	Cerebellar degeneration
5	55	F	11	7	1	Cerebellar degeneration
Mean	47		8	11	1	
SD	13		4	6	0.5	

EMG Surface Electrodes

- Right medial gastrocnemius
- Right tibialis anterior
- Right forearm flexors
- Right forearm extensors

Common Procedures

- Standing in NeuroCom attached to a harness
- Tape placed at posterior and lateral borders of feet
- 7 large backward translations
- 7 fast, 8 degree toes up rotations

Experimental (Light Touch) Condition

- Subject placed right hand lightly touching walker with finger tips (Figure 1)

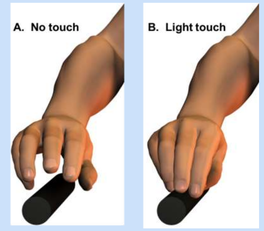

Figure 1. Hand position

Figure 2. No-Touch condition subject positioned inside NeuroCom with hand resting above walker

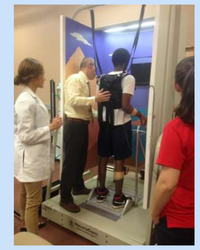

Figure 3. Light Touch condition subject positioned inside NeuroCom with finger tips lightly touching walker (Figure 1)

Results

- In the No-Touch condition, onset latency was 130 ± 18 ms in the Control group and 205 ± 64 ms in the Cerebellar group, $p = 0.06$. Onset latency in the Touch condition was 132 ± 12 ms in the Control group and 197 ± 59 ms in the Cerebellar group, $p = 0.04$
- Mixed model ANOVA revealed an interaction effect between Group and Perturbation, F (7, 56) = 2.29, $p = 0.041$, showing an association between the cerebellar group and initial TA muscle response in the toes-up rotation
  - Initial TA muscle response to the toes-up rotation was excessive in the cerebellar group: 695% more than the no-touch trial compared to 111% in the control group, $p < 0.01$. The amplitudes of the TA muscle responses remained high in the next two trials before settling down in the last four trials, $p < 0.05$ (**Figure 4**)
- Variability in TA muscle response was observed in onset latency and amplitude of response during toes-up rotation (**Figure 5**)
  - Variability in TA onset latency was similar between the Cerebellar and Control groups in the No-Touch condition, averaging 11 ms and 14 ms, respectively. In the No-Touch condition, TA onset latency in the Control group decreased to 9 ms and remained 15 ms in the Cerebellar group, p = 0.003
  - Variability in TA response amplitude in the No-Touch condition differed between the groups, with the Control group at 3 V.s compared to the Cerebellar group at 5 V.s, $p = 0.02$. In the Touch condition, variability in response amplitude was comparable between the groups with an average of 4 V.s
- **Figure 6** illustrates the hypermetric EMG responses and greater variability of muscle responses in a cerebellar subject (average of seven trials)

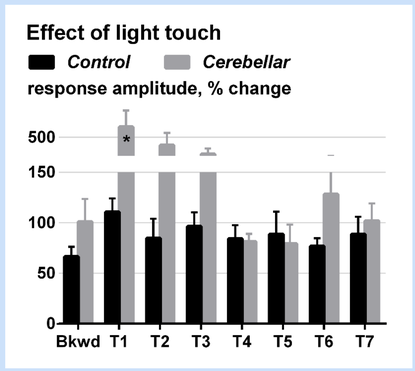

Figure 4. Effect of light touch on response amplitude

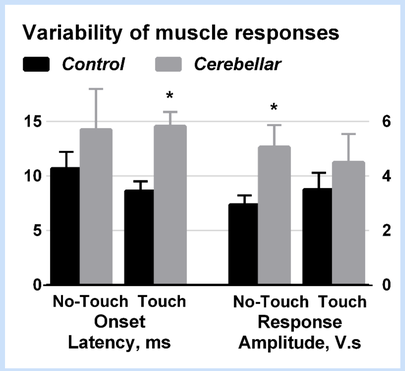

Figure 5. Variability of muscle responses in toes-up platform rotation

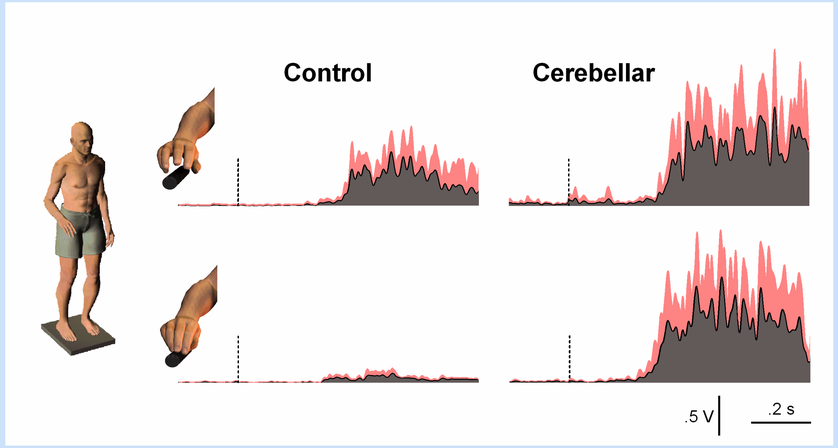

Figure 6. Example of TA EMG activities during toes-up platform rotations

Conclusion

- Physical therapists should continue to use gait training interventions, assistive device training and education, balance retraining, vestibular interventions, visual cues, and functional training programs for task adaptation and functional training
- Subject's with cerebellar disorders demonstrated hypermetric responses to platform perturbations with greater variability in onset latency and response amplitude when compared to control subjects
- The hypermetric responses of subjects with cerebellar disorder found in our study indicate that the cerebellum is involved in modulating postural gain in response to platform perturbations, more specifically in tuning down muscle responses
- These results support the hypothesis that light touch as a form of somatosensory augmentation is not effective in decreasing the variability of onset latency and response amplitude in subject's with cerebellar disorders

Fall Risk Assessment and Fitness to Drive in Persons with Multiple Sclerosis

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Background

- Multiple Sclerosis is a neurological disease that can result in deficits in motor, sensory, visual, and cognitive functions, skills which are needed for both balance and driving.
- These deficits may lead to increased falls and decreased driving ability.

Objective

- To investigate commonalities in motor, sensory, visual, and cognitive deficits in order to later develop a training program that will benefit both balance and fitness to drive.

Methods

- Prospective cross-sectional design
- The study included 10 Participants
- Each participant was scored using series of assessments to test their motor, visual, and cognitive functions.
- Additionally, a balance assessment and a driving assessment were performed.
- The results of these assessments were to analyzed to determine correlations.

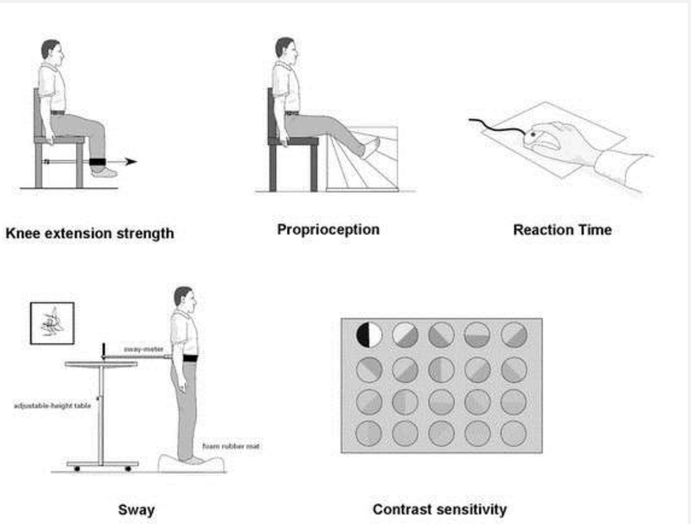
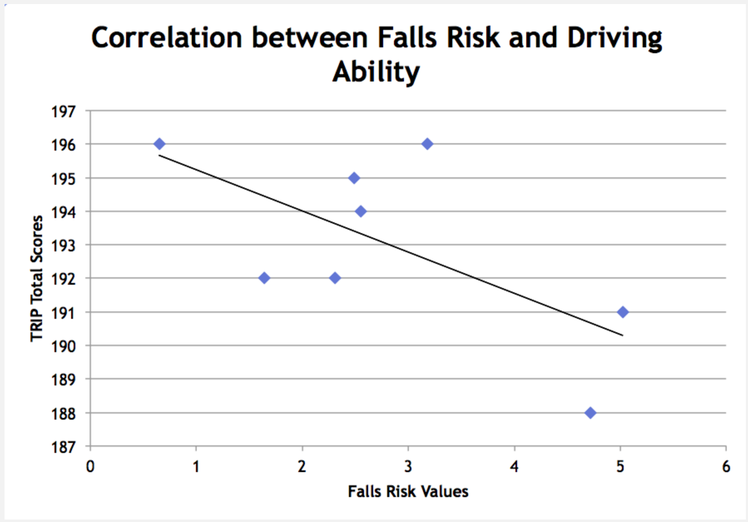


Figure 1: Physiological Profile Assessment: 5 tests

Results



Graph 1: Correlation Between Driving Ability and Falls Risk

Driving Ability			Falls Risk		
Cognitive Variable	r-value	p-value	Cognitive Variable	r-value	p-value
DCe	-0.40	0.33	DCe	0.30	0.43
UFOVDA	-0.78	0.04	UFOVDA	0.40	0.33
SCW	0.32	0.54	SCW	-0.75	0.09
DSrs	0.65	0.11	DSrs	-0.41	0.36
TMTA	-0.53	0.18	TMTA	0.92	0.0014

Table 1: Cognitive Commonalities between Driving Ability and Falls Risk

Correlation between cognitive function and driving ability		
Cognitive Variable	Pearson r	p-value
DC	0.51	0.19
DCe	-0.40	0.33
UFOVPS	-0.82	0.02
UFOVDA	-0.78	0.04
UFOVSA	0.30	0.51
SW	0.32	0.48
SCW	0.32	0.53
DSrs	0.65	0.11
TMTA	-0.53	0.18

Correlation between cognition and falls risk		
Cognitive Variable	Pearson r	p-value
DCe	0.30	0.43
UFOVCat	0.38	0.36
UFOVDA	0.40	0.33
PASATAr1	-0.57	0.18
BDrs	-0.39	0.39
SW	-0.59	0.17
SCW	-0.74	0.09
DSrs	-0.41	0.36
TMTA	0.92	0.0014
TMTB	0.50	0.21

Table 2 and 3: Correlation of Cognitive Variables and Fitness to Drive or Falls Risk

Discussion

- The data exposes similar deficits that result in increased fall risk and decreased fitness to drive in people with MS.
- These deficits cover domains of cognitive processing speed, visuospatial perception, divided attention task, cognitive inhibition, and memory and processing speed.
- Overall weaker correlations between cognitive function and falls risk, likely due to increased motor involvement.

Limitations

- Limitations of this study include: small sample size and the large quantity of correlational analysis' performed.

Conclusions

- If future studies validate these cognitive commonalities a rehabilitation program could be developed that targets both falls risk and driving ability
- A rehabilitation program should additionally include: training targeted at improving specific cognitive deficits related to either fall prevention or driving improvement.

Resources and Acknowledgements

1. Reference place holder if needed

This poster design is adapted from "Allgood M, Pilcher M, Stout A, Threeths J, Cortez-Cooper M. Alter-G® Training Following a Total Knee Replacement" located at http://www.georgiahealth.edu/alliedhealth/pt/research.html.

Effect of Niacin Supplementation on Sleep Function in Parkinson's Patients

Raymond Chong, Chandramohan Wakade, Banabihari Giri, Jon Eidman
Augusta University

Introduction

Parkinson's Disease (PD) is an age-related neurodegenerative disease affecting about 1% of the world population over 65. Growing research regarding progression of Parkinson's Disease suggests niacin supplementation may offer neuroprotection and positive effects on both motor and non-motor symptoms.[1] Recent studies concluded individuals with Parkinson's disease exhibit a poorer niacin index and poorer quality sleep when compared to age matched controls, and that niacin supplementation served to normalize these levels.[2] One case control study reports niacin supplementation was associated with improvements on the UPDRS, PDQ8 quality of life questionnaire, PD sleep scale questionnaire and quality of sleep as measured by Rapid Eye Movement Electroencephalography (REM EEG).[3] In this study we evaluate the effect of niacin supplementation on sleep function as measured by REM EEG in Parkinson's Disease patients.

Methods

Following approval from the Institutional Review Board of Georgia Regents University, we began a study involving 45 subjects randomly assigned into 3 groups. 15 subjects were assigned to the group receiving a dosage, 250mg of slow release niacin. A second group of 14 subjects were assigned to the group receiving 100mg of niacin, and a third group of subjects containing 16 individuals received a placebo. All participants were individuals diagnosed with idiopathic PD. Differences between the groups including age, severity of disease and length of time following diagnosis were not statistically significant preceding the treatment period. Sleep function was evaluated using the Zeo portable EEG headset (fig. 1). Total sleep, sleep quality as indicated by time in deep sleep, and sleep latency were compared before and after 3 months supplementation.

Results

Total Sleep			
Group Name	Pre-test (min.)	Post-test (min.)	p value
250mg Niacin	340 ±90	289 ±101	p=.017*
100mg Niacin	337 ±126	353 ±102	p=.260
Placebo	325 ±79	311 ±88	p=.197

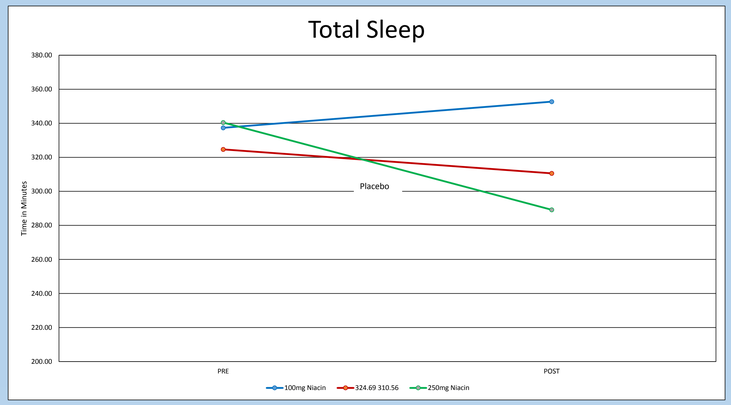
Total Deep Sleep			
Group Name	Pre-test (min.)	Post-test (min.)	p value
250mg Niacin	42 ±31	28 ±21	p=.020*
100mg Niacin	38 ±31	35 ±31	p=.672
Placebo	39 ±32	37 ±33	p=.290

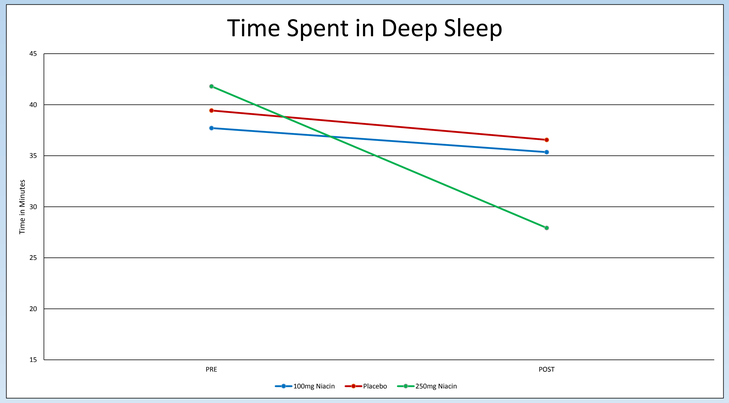
Avg. Time to Sleep			
Group Name	Pre-test (min.)	Post-test (min.)	p value
250mg Niacin	25 ±25	45 ±69	p=.120**
100mg Niacin	22 ±14	15 ±18	p=.228
Placebo	23 ±15	17 ±12	p=.164

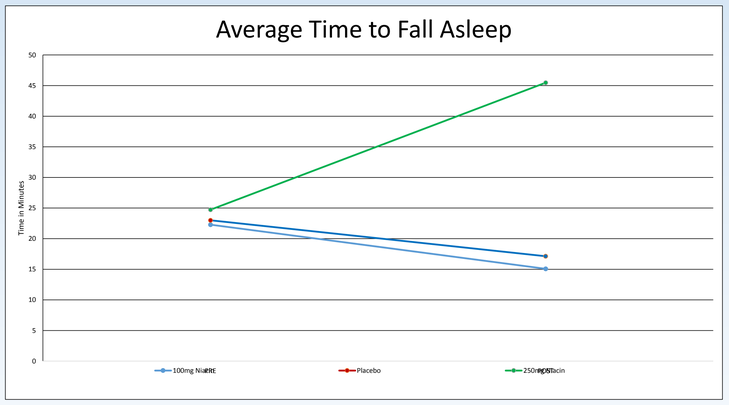
* Indicates significance
** Indicates near significance

Figure 1

Results







Conclusion

The average values for pre and post test scores of each group were compared for significant differences using a two-tailed t-test. Total sleep, sleep quality as indicated by time in deep sleep, and sleep latency were compared before and after 3 months supplementation. Both the placebo and 100mg niacin groups exhibited no statistical change in any category while the 250mg niacin groups showed signs of a slight deterioration in sleep function as measured by total sleep and time spent in deep sleep following the trial period.

Discussion

Further studies are warranted to understand the association of niacin with sleep function in Parkinson's Disease. Placebo effect and difficulties in maintaining blinding throughout the study due to a flushing effect, a commonly experienced side-effect of niacin, may have confounded results. In an effort to avoid this effect in the 250mg niacin supplement, a slow release table was used which may have reduced its efficacy. This result may indicate that a large dosage administered in a short amount of time may be necessary to increase the mass effect of niacin on GPR109A and decarboxylase inhibitors.

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AUGUSTA UNIVERSITY

The Use of the AlterG® Anti-Gravity Treadmill to Promote Independent Walking after Stroke: A Pilot Randomized Controlled Trial

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Jonathan Garrett
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Abstract

Cerebrovascular accidents or strokes are one of the leading causes of adult disability and death with more than 795,000 incidents annually. The severity of stroke varies, but marked impairments in balance, agility, coordination, and gait are integral components of nearly all activities of daily living (ADLs) and the hallmark disabilities seen in post-stroke patients. The direct approach to assessing gait recovery has been focusing on ambulation in individuals post-stroke and many experiments have been conducted using body weight support systems. There have been limited experiments conducted using the Anti-gravity treadmill (AlterG). The Wii Balance Board (Wii BB) has been used to assess dynamic balance in participants. The purpose of this study was to assess balance and gait improvements between subjects who used either AlterG or Wii BB.

Two individuals with a prior medical diagnosis of either hemorrhagic or ischemic stroke were recruited. Only subjects who had a first-ever stroke, according to the WHO criteria and confirmed by CT/MRI scans were included after being screened by a neurologist. Both subjects completed 9 sessions with either the Alter-G or the Wii balance board. Each of the 9 session was 30-minutes in duration 3x a week for 3 weeks.

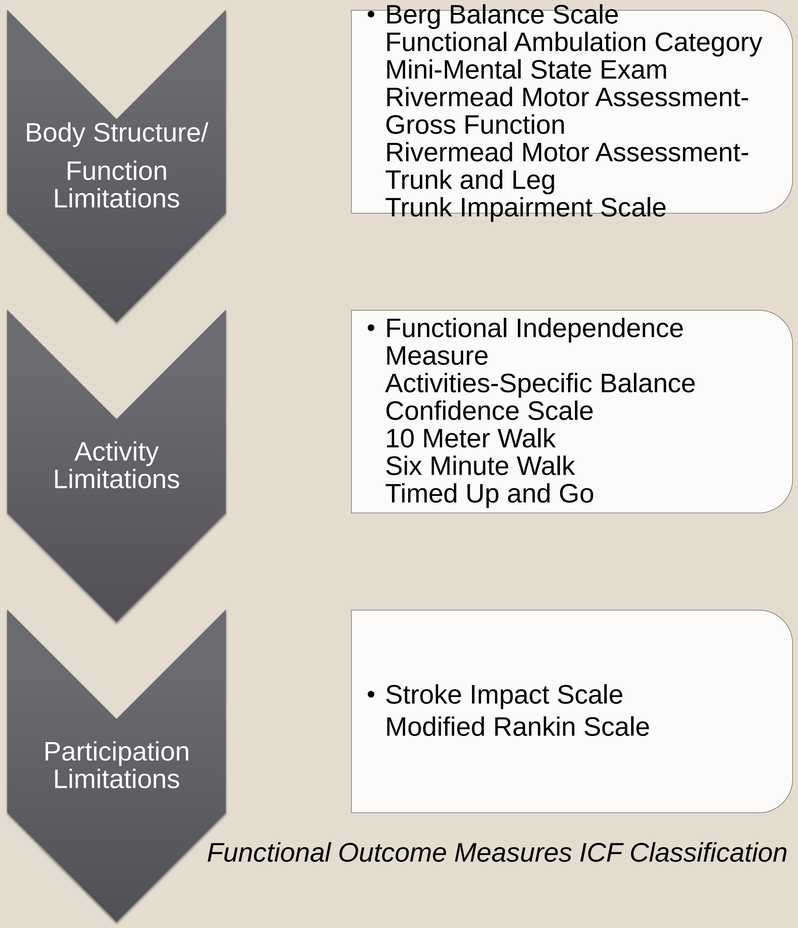
Outcome measures were chosen to address all levels of the ICF model. All measures were taken pre-training and post-training. The Timed Up and Go test was used to analyze dynamic balance, while ambulation endurance was assessed using the 6-minute walk test. Individual walking speed was measured using the 10 meter walk test. The minimal detectable change (MDC), and minimal clinically important difference (MCID), was specifically used during the data analysis to measure improvement. Outcome measures that had cut off levels for functional independence or specific grading scales were also analyzed for changes, such as fall risk, independence levels, and overall function.

Both subjects improved walking distance on the 6 minute walk and completed the Timed Up and Go quicker on post-testing. However neither subject reached clinically relevant improvement as measured by established MCD and MCID scores. Based on the data, additional studies with a larger sample size need to be conducted to test the efficacy of AlterG walking and Wii balance board training for ambulation and balance recovery after stroke.

Subjects

Classifications	Subject 1	Subject 2
Medical History	Left-sided CVA	Right-sided hemorrhagic CVA
Time since diagnosis	4 months	6 months
Age	75	80
Genger	Male	Female
Protocol	Will Balance Board	AlterG

Functional Outcome Measures



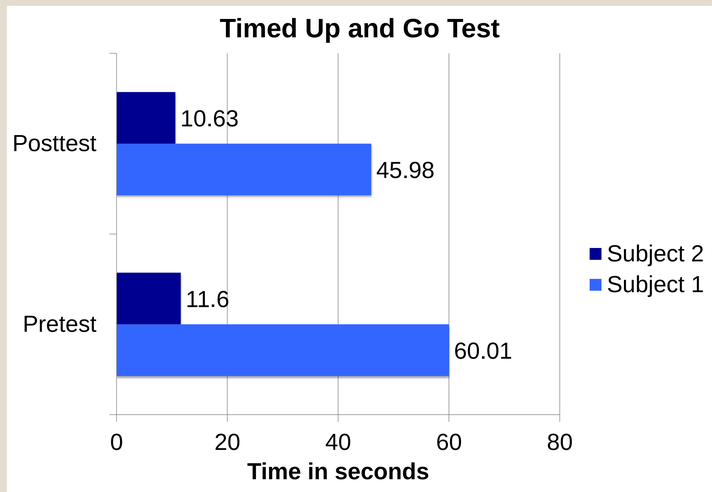
Functional Outcome Measures ICF Classification

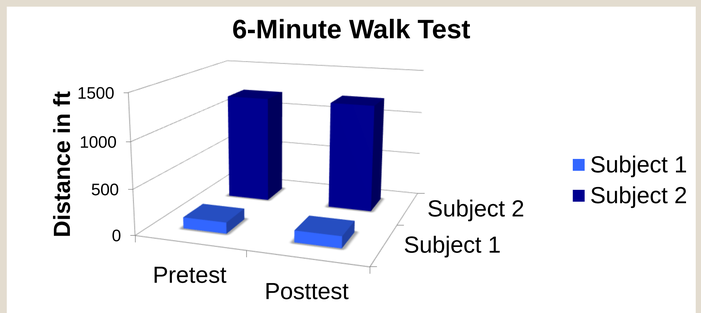
Methods

Subject 1 completed an AlterG walking protocol and subject 2 completed Wii training using the Wii Balance Board. Both subjects completed 30-minute sessions 3x a week for 3 weeks. Each training session for the AlterG followed the same format which included 2 bouts in each of the categories, which focused on endurance, independent walking, and speed. Subject 2 completed a variety of Wii-Fit games including focusing on balance, stability, flexibility, and strength and endurance. The subject was progressed by changing position from sitting t standing, increasing the number of repetitions performed, and narrowing the base of support.

Results

Outcome Measures	Subject 1			Subject 2		
	Pre	Post	Change	Pre	Post	Change
TUG	1:00:01	45.98s	-14.03s	11.6s	10.63s	-0.97s
6MWT	122 ft 7 inches	128ft	+5.3ft	1210 ft 1 inch	1212 ft 7 inches	+2 ft 6 inches
10MWT	1:15:05 (0.039m/s)	1:09:08 (0.043m/s)	-5.97s (0.004m/s)	9.49s (1.054m/s)	12.27s (0.815m/s)	-2.78s (0.239m/s)*





Conclusions

Both subjects improved walking distance on the 6 minute walk and completed the Timed Up and Go quicker on post-testing. However neither subject reached clinically relevant improvement as measured by established MCD and MCID scores. Based on the data, additional studies with a larger sample size need to be conducted to test the efficacy of AlterG walking and Wii balance board training for ambulation and balance recovery after stroke.

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Acknowledgements

This poster is adapted from "Hicks C., Schwartz A., Morris S, Garrett, J. The Relationship Between Sensory Integration, Balance and Executive Function in Older Adults"

Activity Level in Patients Following Total Knee Arthroplasty: Are They Meeting Minimum Guidelines?

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INTRODUCTION

The primary reason for patients undergoing a total knee arthroplasty (TKA) is a loss of function and severe pain from end-stage knee osteoarthritis (OA).[3,9,11,14,21] The risk factors associated with OA are similar to those for cardiovascular disease and can be reduced with regular exercise.[1] TKA significantly reduces knee pain from osteoarthritis.[12,13,15,16,18-20] However, despite less pain, we suspect that activity levels at 6 months post-operation are lower than expected. Because physical activity can significantly reduce the risk of a variety of diseases, and the magnitude of its effect is dose-dependent, restoration of physical activity to the recommended level is an important participation goal.

PURPOSE

The purpose of this study was to:

- Determine if patients status post unilateral total knee arthroplasty are meeting minimum recommended guidelines for physical activity as set forth by the American College of Sports Medicine.
- If Alter-G® treadmill training can increase physical activity without increasing joint pain

METHODS

5 patients (2 male, 3 female) were recruited from local area clinics and randomly divided into STEP (control) or STEP+ (experimental) groups.
Inclusion criteria were:

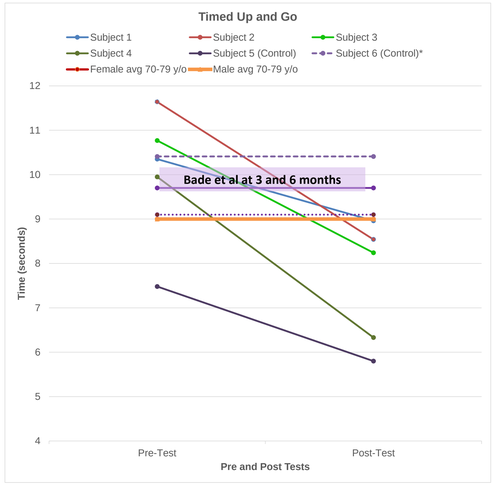
- unilateral TKA
- age 65 or older,
- Medicare beneficiary,
- Receiving no more than 1 physical therapy treatment per week
- between 3-6 months post surgery.

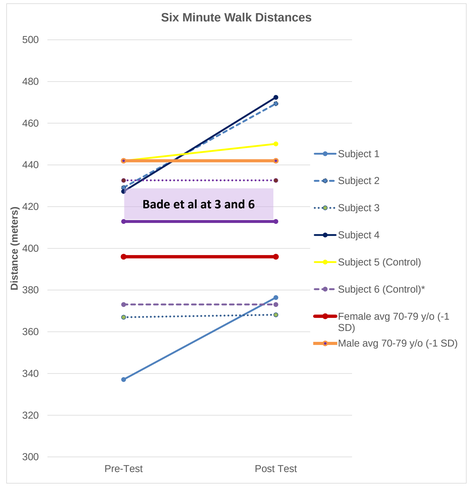
Step+ group (n=4) used a pedometer to record daily steps and attended biweekly training session for 4 weeks using the Alter-G® positive pressure treadmill system. Outcomes were compared pre and post intervention and included 5x Chair Rise, Single Limb Stance Time, LEFS Score, Average Daily Steps, Timed Up and Go, and 6 Minute Walk Test.

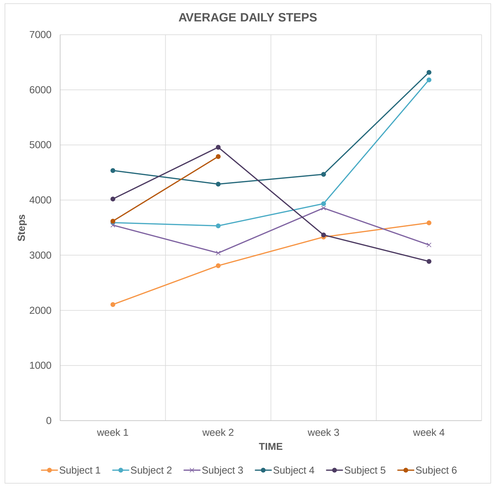
Step group (n=1) was seen once per week for 4 weeks to record pedometer data, monitor vital signs, and answer any questions participants may have had.

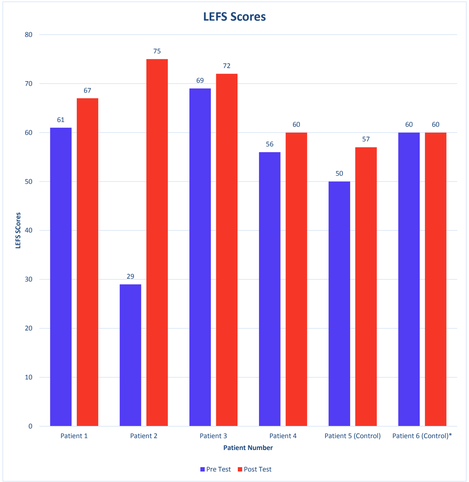
RESULTS

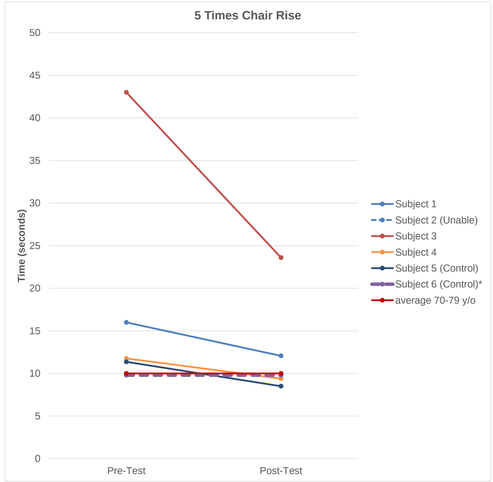
Patient Characteristics	
N = 6 (2 – M; 4 – F)	Average
Age (years)	74.8 ± 6.4
Waist Circumference (cm)	94.18 ± 7.45
Weight (lbs)	185.98 ± 53.79
Height (in)	65.17 ± 3.54
BMI (kg/m^2)	30.45 ± 6.86
Daily Steps	3570 ± 810











DISCUSSION

- After the first week of intervention, the average number of daily steps for all participants was 34% below the ACSM's minimum recommendation.
- Compared with controls, all subjects in STEP+ group improved average number of daily steps from baseline and increased their daily average number of steps by 35%
- All subjects in STEP+ improved both Timed Up and Go and 5 Times Chair Rise times and a majority improved 6MWT distance.
- Following intervention, all subjects in the STEP+ group performed well above age and gender norms on the Timed Up and Go Test.
- Subjects in both groups experienced less pain by the end of the study. Further research is necessary to examine the role the Alter-G® in pain reduction.

CLINICAL RELEVANCE

- Alter-G® may serve as a tool to help patients s/p TKA increase physical activity levels without increasing pain.
- Based upon improvement in TUG Scores, Alter-G® may help to reduce risk of falls in this population
- Patients should receive education on the benefits of achieving the ACSM recommended number of daily steps and be assisted in achieving this participation goal

LIMITATIONS

- Small sample size
- Short duration
- Few control patients
- Medicare patients only

ACKNOWLEDEGEMENTS

Special thanks to our study participants and Alter-G®

Poster Adapted from:
Allgood et al. *Alter-G® Training Following a Total Knee Replacemen*t. 2015.

A Pilot Study to Investigate the Association Between Baroreflex Sensitivity and Ambulatory Blood Pressure

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AUGUSTA UNIVERSITY

Introduction

- Baroreflex sensitivity (BRS) plays a crucial role in the short term regulation of BP. A rise in BP results in baroreceptor activation and stimulates both parasympathetic activation and sympathetic inhibition.
- Decreased sensitivity of the BRS results in impaired control of BP fluctuations that promotes the onset and development of cardiovascular disease. [1-3]
- Ambulatory blood pressure (ABP) provides a better estimate of the "true" BP and stronger predictive value for cardiovascular events when compared to clinical measurements.[4]
- The primary purpose of this study was to gather preliminary data on the relationship between BRS, ABP, and body composition.

Methods

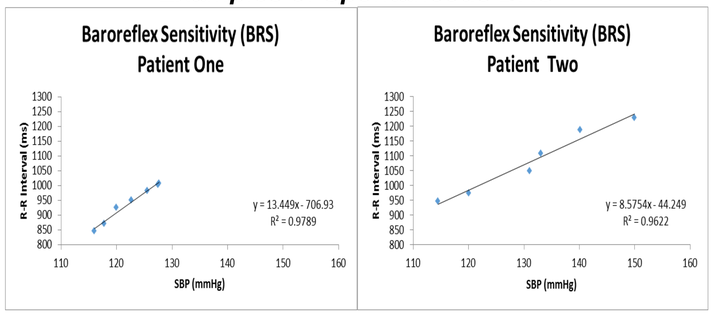
- Healthy adults ages 25-40 who were non-smoking, non-diabetic, with a BMI of 25-40 kg/m^2 and a BP greater than 120/80 non-medicated were recruited.
- Participants were excluded if they had known coronary artery disease, chronic pulmonary disease, stroke, and/or a chronic neurological condition. Additionally, participants were excluded if they had a recent hospitalization (within the past six months), and/or were currently receiving care for a current illness or medical condition.
- Outcome Measures: BRS methodology, 24 hour ambulatory blood pressure, dual-energy X-ray absorptiometry, and 24 hour activity log.
- Data Analysis: BRS was assessed via the sequence method with values being determined for various averages and specific events. Additionally, the correlation, standard deviation, and R squared were taken for all BRS values. Finally, a comparison table of the two subjects was compiled that focused on the outcome measures performed.

Results

Participant Characteristics

Subject	One	Two
Age (years)	35	27
Occupation	Maintenance	Student
Percent Fat (%)	23.6	12.1
Trunk Fat (%)	26.9	11.4

Examples of Spontaneous BRS



BRS Summary

Subject	One		Two	
BRS Events	R	Slope (ms/mmHg)	R	Slope (ms/mmHg)
Runs 4+	0.9313	21.32+/-22.92	0.9098	13.06+/- 9.06
Runs 5+	0.9421	17.49+/-14.48	0.9049	14.62+/-10.78
Spontaneous	0.9420	19.57+/-20.80	0.9412	14.51+/-10.72
Grip	0.9654	18.28+/-7.31	0.9629	19.64+/-7.84
Timed Breathing	0.9289	22.80+/-11.99	0.9026	9.91+/-4.60

ABP Values

Subject	One		Two	
Time of Day	Day	Night	Day	Night
SBP (mmHg)	131(6.3)	122(7.9)	124(9.8)	121(6.2)
DBP (mmHg)	75(7.4)	66(7.4)	68(8.8)	58(5.7)
PP (mmHg)	57(8.4)	56(9.8)	56(9.9)	63(5.4)
HR (bpm)	67(5.9)	66(7.4)	56(6.1)	47(7.0)
Dipping SBP (%)	6.90		2.50	
Dipping DBP (%)	12.10		14.80	
SBP >120 at Night (%)	49.7		35	

*Day = Wake Period 6 AM – 10 PM
**Night = Sleep Period 10 PM – 6 AM

Reference Values

ABP Reference Values[5]	Day	Night	24 Hour	BRS Reference Values (ms/mmHg)[1, 3, 6]
Optimal (mmHg)	<130/80	<115/65	<125/75	
Normal (mmHg)	<135/85	<120/70	<130/80	23.9; 25.0; 21.5
Hypertension (mmHg)	>140/90	>125/75	>135/85	
*ABP Suggested Upper Limits				

Discussion

- BRS values obtained were similar to those found in the literature. [1, 3]
- Dipping status was less than the recommended 10% for both subjects. [5]
- BRS was higher in the subject with the slightly better dipping status despite being older and having more body fat.
- Occupational physical activity may help preserve BRS.
- Current methods used to measure BRS was validated and can be used to recruit a larger sample size to elucidate the role of BRS on ABP and the short term control of BP.
- Future studies should assess the influence of other variables that influence BP, such as hormones, salt intake, stress, and a more comprehensive measure of activity.

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Acknowledgements

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AlterG Treadmill Training After Stroke: A Feasibility Study

Sy Garrison and Meghan Hendrixson
Research Advisor: Dr. Hannes Devos
Department of Physical Therapy, Augusta University, Augusta, GA

Introduction

- Almost 800,000 individuals experience stroke each year in the United States (CDC, 2015)
- Stroke is the leading cause of long-term disability, which includes impairments in the ability to walk
- Physical therapy can help the recovery process after stroke and improve functional ambulation
- Evidence supports the use of body weight supported treadmill training (BWSTT) as an effective method of rehabilitation to improve walking after stroke (Jorgensen et al, 2010)
- A new system of BWSTT, the AlterG Treadmill, is an innovative anti-gravity treadmill system that can provide relief of up to 80% body weight through the use of an air chamber that unweights the lower extremities (Figure 1)
- The primary purpose of this study was to evaluate the safety and feasibility of using the AlterG treadmill in a stroke rehabilitation setting
- The secondary purpose of this study was to explore the efficacy of implementing an intervention protocol, using the AlterG treadmill, on walking ability after stroke

Methods

Subject

- This study was a single subject design. The patient was an 80-year old female that experienced stroke 8 months prior and presented with mild residual impairments.

Procedure

- 9 total sessions (1 hour each, spread over 3 weeks, at 3 sessions per week)
- Treadmill training consisted of 3 parts: endurance, independent walking, and speed

Safety

- Safety of using the AlterG was assessed by observing for adverse events that may include but are not limited to: falling, injury, significant rise or drop in blood pressure or heart rate, and red flag symptoms (dizziness, difficulty breathing, etc…)

Feasibility

- Feasibility of using the AlterG was assessed by observing the amount of time it took in each session for the following: debriefing, getting in and out of the AlterG, total time training, and rest breaks.

Satisfaction

- Patient satisfaction with using the AlterG was assessed by using the System Usability Scale

Efficacy

- Outcome measures were performed pre and post-training to assess efficacy of using a treadmill protocol with the AlterG**:** Berg Balance Scale, Functional Ambulation Category, Mini Mental State Exam, Rivermead Motor Assessment (Gross Function, Trunk, and Leg), Trunk Impairment Scale, Functional Independence Measure, and Activities Specific Balance Confidence Scale
- Efficacy was also assessed by observing changes throughout sessions in walking distance, speed, and body weight support

Conclusion

- The AlterG Treadmill system is both safe and feasible to use in a rehabilitation setting for individuals who have experienced mild stroke
- The AlterG Treadmill was also effective in improving walking distance and walking speed
- However, further studies are necessary to examine the feasibility and efficacy of using the AlterG treadmill in more severe cases of stroke with larger impairments

Figure 1: AlterG BWST

Results

Safety

- There were no adverse events during the entirety of the 9 treatment sessions
- BP and HR were taken prior to training, after each bout of exercise, and at the end of the training session.
- The participant wore a gait belt at all times during the session

Satisfaction

- Using the System Usability Scale, the participant was 90% satisfied with using the AlterG (Table 1)
- The patient would use the AlterG again if available and felt very confident while training inside the system

System Usability Scale

I think that I would like to use this system frequently.	5
I found the system unnecessarily complex.	1
I though the system was easy to use.	4
I think that I would need the support of a technical person to be able to use this system.	4
I found the various functions in this system were well integrated.	5
I thought there was too much inconsistency in this system.	1
I would imagine that most people would learn to use this system very quickly.	5
I found the system very cumbersome to use.	1
I felt very confident using the system.	5
I needed to learn a lot of things before I could get going with this system.	1

Table 1: 1 indicates strongly disagree; 5 indicates strongly agree

Feasibility

- Total training time increased and total rest time declined, which indicated an increase in walking time across the 9 sessions (Figures 2 & 3)
- Preparation and debriefing time took approximately 2.3 min. in length
- Assisting the participant in and out of the AlterG took a maximum of 5 min. to get in and 2 min. to get out

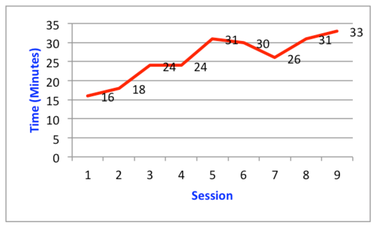

Figure 2: Total Training Time

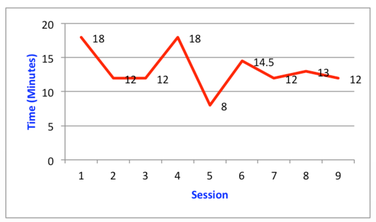

Figure 3: Total Rest Time

Efficacy

- Throughout the 9 sessions, walking speed and total walking distance increased while body weight support decreased (Figures 4, 5, & 6)
- Improvements were seen in the 4 out of the 7 outcome measures assessed: Functional Ambulation Category, Rivermead Motor Assessment, Mini Mental State Examination, and Functional Independence Measure

Pre and Post Training Outcome Assessments

Test/Measure	Pre-Training Results 12/10/15	Post-Training Results 2/5/16
Berg Balance Scale	47/56	47/56
Functional Ambulation Category	3	4
Mini Mental State Exam	29/30	30/30
Rivermead Motor Assessment – Gross Function	9/13	11/13
Rivermead Motor Assessment – Trunk and Leg	8/10	10/10
Trunk Impairment Scale	27/28	24/28
Functional Independence Measure	114/126	117/126
Activities Specific Balance Confidence Scale	38.44%	35.31%

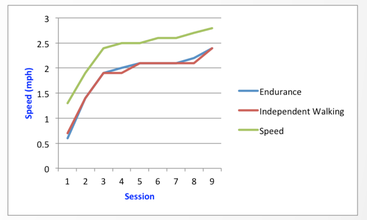

Figure 4: Walking Speed

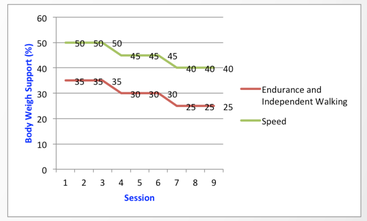

Figure 5: Body Weight Support

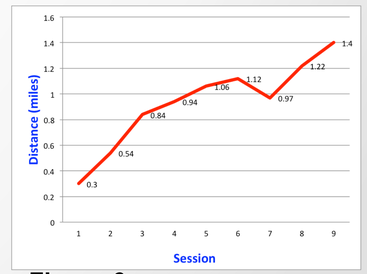

Figure 6: Total Walking Distance

This poster design is adapted from: Strickland A, Ward K, Wakade C, Chong R. Parkinson's Disease Symptoms and GPR109A: Effect of Niacin. Located at http://www.georghealth.edu/alliedhealth/pt/research.html.

Use of Expert Recommended Exercises in the Treatment of a Patient with Unilateral Subacromial Impingement Syndrome: A Case Report

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INTRODUCTION

The relationship between rotator cuff pathology and subacromial impingement syndrome (SIS) can be seen when considering the kinematic association between the anatomy of the shoulder and the action of the rotator cuff muscles (i.e. supraspinatus, subscapularis, infraspinatus, and teres minor). With their origin on the scapula and insertion points on the greater and lesser tubercle of the humerus, the four muscles of the rotator cuff provide overall compression and depression of the humeral head to prevent the superior migration of the humeral head into the undersurface of the acromion during overhead movements. A review of literature did not provide a standard protocol for the rehabilitation of SIS. The purpose of this case study is to test the clinical application of a plan of care that implements expert recommended exercises in the treatment of a patient with unilateral SIS.

CASE DESCRIPTION

History:
- 54 year-old, left-hand dominant Caucasian female
- Referred to outpatient PT secondary to R shoulder pain persisting for three months with no known mechanism of injury
- X-ray revealed mild arthritis in R shoulder
- Chief complaint: inability to use R arm secondary to pain which was described as an achy pain that got worse with certain movements
- Aggravating factors: holding heavy objects out to the side, pushing heavy doors open, watering flowers with five gallon water bucket, moving arm overhead, picking up purse from passenger seat

Examination:
- Range of motion (AROM/PROM) within normal limits for all joints of R upper extremity
- Strength deficits in shoulder abduction, flexion, internal rotation, external rotation, retraction, and scaption
- Pain noted with shoulder abduction, flexion, internal rotation, and scaption
- Special Tests:
  - (+) Painful Arc
  - (+) Infraspinatus Muscle Strength Test
  - (-) Hawkins-Kennedy
  - (-) Neer's
  - (-) Empty Can
  - (-) Drop Arm
- Outcome Measures/Questionnaires:
  - Numerical Pain Rating Scale (NPRS): 4/10
  - Simple Shoulder Test (SST): 8/12
  - Shoulder Pain and Disability Index (SPADI): 25.4%
  - Focus on Therapeutic Outcomes (FOTO): 59 physical functional score
  - Functional Abduction Reach Test: 3/10 at 80 degrees; 4/10 at 130 degrees

Evaluation:
Upon completion of the examination, it was noted that the patient was able to achieve full AROM and PROM of R shoulder while pain ceased to exist as the patient passed 160 degrees of shoulder abduction, a common clinical sign of SIS. A deficit in shoulder musculature strength was also found and concluded to be a contribution to the patient's deficits. Mild forward head and rounded shoulders were also noted.

Diagnosis:
- Medical: R shoulder pain
- Physical Therapy: Pattern 4C—Impaired Muscle Performance
  - ICD-9 Code 726.2 and ICD-10 Code M75.41

Prognosis:
For Practice Pattern 4C the APTA Guide to Physical Therapists Practice expects the patient to benefit from six to thirty visits while predicating optimal muscle function and performance within two to six months. Considering the patient's presentation, lack of consensus among the literature, and her personal factors, it was determined the patient would benefit from completing ten sessions by attending therapy twice a week for five weeks. However, due to unforeseeable personal factors, the patient only completed nine therapy sessions.

Interventions:
Interventions were chosen based on a concept paper of exercises that best activated the rotator cuff musculature. Electrical stimulation and cryotherapy were used to help alleviate the patient's pain. The treatment plan consisted of two phases: 1) Preparatory Phase and 2) Strengthening Phase. Transition to the second phase was permitted once the patient performed the exercises without an increase in pain. This occurred at visit three. Each phase began with a six-minute upper body ergometer warm up—three minutes pedaling forwards and three minutes pedaling backwards. The remaining exercises were performed for two sets of fifteen repetitions.

Key Exercises Performed	
Preparatory Phase	Upper body ergometer (forward/backward), Resisted IR, Bilateral ER, Standing flexion, Standing abduction, Standing full can, Side-lying ER, Prone row, Scapular retraction
Strengthening Phase	Upper body ergometer (forward/backward), Resisted IR, Bilateral ER, Prone full can, Side-lying ER, Supine serratus punch, Prone row, Scapular retraction

OUTCOMES

Outcome measures were taken upon initial evaluation, throughout the episode of care, and upon discharge. Pain levels prior to treatment were monitored using a patient reported NPRS value. The patient's responses are reported in Figure 1. The patient's SST improved from 8/12 to 11/12 indicating an improvement in shoulder function. The patient's SPADI score improved from 25.4% to 9.2% indicating less disability was present at the conclusion of the plan of care. Although no literature was found to support or oppose its use in the clinic, the patient completed a FOTO her initial visit and upon discharge. Her functional score increased from 59 to 69 with a patient satisfaction score of 100% upon discharge.

A functional measure designed by the author, the Functional Abduction Reach Test, was conducted by asking the patient to slowly lift her right arm in the plane of scaption until she first experienced a pain level greater than that at rest. The therapists measured this angle which was 80°. A second measurement was taken at the midpoint of the remaining AROM which was 130°. The patient reported a three point pain level decrease at both angles from initial evaluation to discharge. No pain was experienced at 80°. A pain level of 1/10 was experienced at 130° but resolved when the patient achieved full AROM. Results can be found in Figure 2.

Figure 1. Pain Trend during Episode of Care

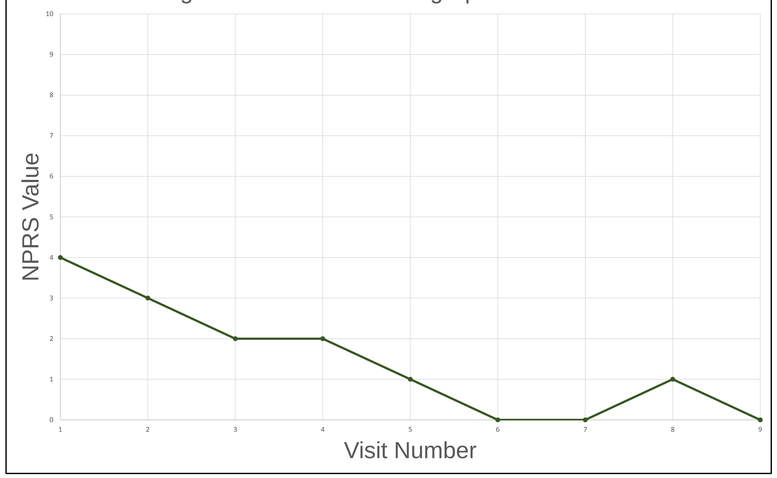
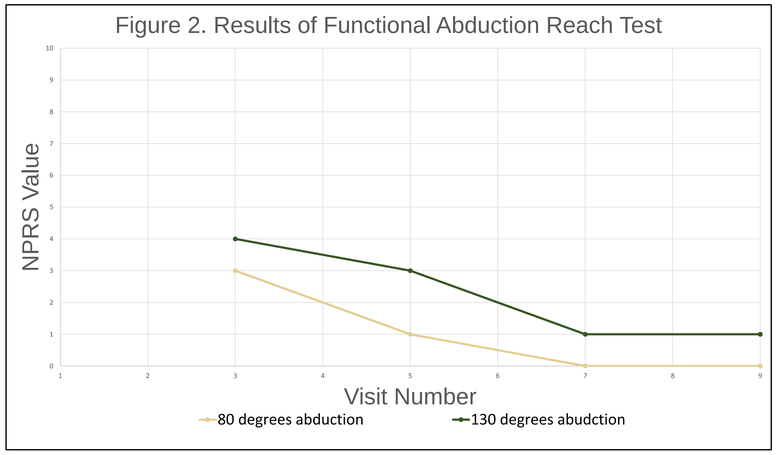


Figure 2. Results of Functional Abduction Reach Test



DISCUSSION

At the conclusion of nine physical therapy visits, the patient responded favorably to the plan of care by demonstrating clinically important differences in both pain levels and functional status without increasing her symptoms. Patient satisfaction with therapy was confirmed through verbal satisfaction as well as portions of the FOTO. Although no standard protocol exists for the treatment of SIS, the outcome of this case report support the inclusion of expert recommended exercises. Limitations to this case report include the lack of experimental design and long-term effects of the treatment plan. However, this case report does support the consideration of expert recommended glenohumeral and scapulothoracic exercises in the treatment of patients with unilateral SIS.

CONCLUSION

This case report supports the potential inclusion of expert recommended exercises in the treatment of unilateral SIS. Although all outcome measures demonstrated meaningful improvement in the patient's pain and function, further studies are needed to verify the clinical use of the FOTO and Functional Abduction Reach Test.

The Effects of an Extension Oriented Treatment Approach (EOTA) combined with Mechanical Traction in the Treatment of Low Back Pain with Radiculopathy

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Introduction

One common cause of low back pain is a herniated disc, also described as lumbar derangement, resulting from extended periods of time in a position of lumbar flexion. There is no clear consensus on the best way to treat a lumbar derangement with radicular symptoms, but a common method employed today is through the use of extension oriented treatment approach (EOTA). The goal of an EOTA for patients with radicular symptoms caused by a lumbar herniated disc is to centralize radicular symptoms and reduce the derangement. The McKenzie method is a commonly used treatment aimed at assessing and centralizing radicular pain based on the directional preference of a patient. Traction, as a treatment for low back pain, has demonstrated varying levels of evidence to support its effectiveness; it has not been studied very thoroughly when combined with other management techniques, yet remains a popular treatment strategy nonetheless. Both treatment methods have shown efficacy in the management of lumbar derangement syndrome, but the evidence is limited for these two treatments used in conjunction with one another. The objective of this case report is to examine the outcomes of an EOTA in combination with mechanical traction in the conservative management of a patient with lumbar derangement and radicular symptoms who was previously scheduled for surgery.

Methods

Case Description

History:

The patient, a 57 year old male, entered the clinic with complaints of low back pain with radicular symptoms originating approximately 8 weeks prior. An MRI report was included in the patient's record and showed pathological disc protrusion at L4-L5 and L5-S1. The MRI results stated there was compression at the L5 nerve root. The patient owns a construction company and reported spending extensive time driving between construction sites. Pain had severely limited the patient's ability to work, drive, and sleep

Examination:

Range of Motion

Listed in Table 1.

Strength

Graded 5/5- R Dorsiflexion, R Plantarflexion, R Great Toe Extension

Graded 4/5- Bilat. Hip Flexion, Bilat. External Rotation, Bilat. Internal Rotation, Bilat. Knee Flexion, Bilat. Knee Extension, L Great Toe Extension

Deferred Secondary to Pain- Bilat. Hip Extension, Abduction, and Adduction.

Special Tests

Positive- Slump Test, Straight Leg Raise, Lumbar Quadrant Test, FABER Test, FADDIR Test, Scour Test, Repeated Flexion

Negative- SI Compression Test, SI Distraction Test, Repeated Extension

Evaluation

The findings of the patient's abnormal MRI were confirmed through physical therapy evaluation in conjunction with the treatment based classification system outlined by the APTA. The patient had a severely crippling score on the Oswestry questionnaire (70%).

Diagnosis

Based on the patient's description of symptoms, onset, and daily lifestyle combined with a physical examination which included musculoskeletal, neuromuscular, and special testing, the patient was diagnosed with a L5 nerve root compression secondary to a lumbar disc herniation

Prognosis

According to the APTA Guide to Physical Therapist Practice, the practice pattern for this patient is 4F. The patient has a good potential for rehabilitation due to his initial response to extension-based postures, previous level of physical activity, previous level of functioning, age, motivation for therapy, and social support group. Based on the very similar case study and treatment performed by Gagne and Hasson, the entire course of treatment should not exceed 5 weeks of treatment time or 15 physical therapy visits.

Intervention

Initial intervention for this patient (phase 1, visits 1-6) was based heavily upon patient education in order to gain the trust and understanding of the patient. The initial goal of therapy (phase 1) was centralization of radicular symptoms and this was achieved through extension-based exercises and the avoidance of lumbar flexion based postures through patient education. Extension based exercises have been shown to reduce the compressive force on the nerve roots of the lumbar spine. This initial phase of therapy (phase I) consisted of 3 visits per week for 2 weeks followed by mechanical traction combined with therapeutic exercise phase (phase II, visits 7-12) which also consisted of 3 visits per week for 2 weeks.

Phase 1	Visit 1	Visit 2	Visit 3	Visit 4	Visit 5	Visit 6
Patient Education	35 min					
Prone Press-Ups	3 x 15	3 x 15	3 x 15	3 x 15	3 x 15	3 x 15
Prone w/ Pillow under Chest	5 min	5 min	5 min	5 min	5 min	5 min
Prone Press-Ups w/ Overpressure	3 x 15	3 x 15	3 x 15	3 x 15	3 x 15	3 x 15
Standing Back Extensions	3 x 15	3 x 15	3 x 15	3 x 15	3 x 15	3 x 15

Phase 2	Visit 7	Visit 8	Visit 9	Visit 10	Visit 11	Visit 12
Prone Press-Ups	3 x 15	3 x 15	3 x 15	3 x 15	3 x 15	3 x 15
Prone w/ Pillow under Chest	5 min	5 min	5 min	5 min	5 min	5 min
Prone Press-Ups w/ Overpressure	3 x 15	3 x 15	3 x 15	3 x 15	3 x 15	3 x 15
Standing Back Extensions	3 x 15	3 x 15	3 x 15	3 x 15	3 x 15	3 x 15
Traction						
Load	70 lb	70 lb	70 lb	80 lb	80 lb	80 lb
Duration	10 min	10 min	10 min	10 min	10 min	10 min

Results/Outcomes

Clinically meaningful changes were seen in the Oswestry Disability Index which was given to the patient day 1 of therapy and at the completion of the last visit. The patient's Oswestry score decreased from 70%, a crippling score, to 16% which represents minimal disability . The pain (on the NPRS) decreased from 10/10 to 4/10 after 2 weeks, but was still rated as moderate pain. Further improvements were seen after 4 weeks when the pain rating decreased to 2/10. The patient was given the Timed Up and Go test on the initial physical therapy visit. Through 3 trials the patient averaged a time of 15.5 seconds. The score at the end of the 4 weeks of treatment was less than half of the initial score at 6.3 seconds.

Table 1-- ROM, Pain, and Oswestry Results

Objective Results	Day 1	Description	2 Weeks	Description	4 Weeks	Description
Flexion	23°	Painful (Radicular)	68°	Minimal Pain	73°	No Pain
Extension	15°	Painful (Radicular)	32°	No Pain	31°	No Pain
R Side Bend	13°	Painful (Radicular)	22°	No Pain	22°	No Pain
L Side Bend	8°	Painful (Radicular)	20°	No Pain	22°	No Pain
R Rotation	29°	Painful (Radicular)	40°	Minimal Pain	43°	No Pain
L Rotation	33°	Painful (Radicular)	46°	Minimal Pain	45°	No Pain
Totals	121°		228°		236°	
% Change		88.4%		03.5%		
NPRS Score	10/10		04/10		02/10	
Oswestry Score	70%	Crippling Disability			16%	minimal disability

Discussion

The patient in this study saw most of his improvements during the initial extension-based exercise phase, but continued to see improvements in the second phase which added mechanical traction to the extension exercises. The combination of treatments was very effective in reducing the patient's pain and improving function. The mechanical traction seemed to have a possible effect in adjunct with the extension exercises. Centralization and a positive response to extension movements during the initial examination is important in identifying patients that may respond well to traction and extension-based exercises. Functional improvements in the patient's everyday life were objectively documented via the Oswestry questionnaire. Some residual pain did remain following physical therapy for this patient, specifically regarding lifting and mildly in other areas such as personal care, sitting, standing, sex life, travelling, and social life, but none of these activities were limited by pain. Continued management of the patient's back pain through the patient education techniques (extension exercise and positioning) taught should reduce this pain. Limitations in this case study include a limited number of outcome measures taken during a limited amount of time. Collecting outcome data more frequently would provide us with a better idea of how effective the treatment was, especially with the Oswestry and TUG in between phases of treatment. Also, the patient did not have a long-term follow-up to determine whether treatment remained effective over time.

Conclusion

The evidence in this case report supports the use of extension-based exercises in conjunction with mechanical traction for the treatment of a herniated lumbar disc with a nerve root compression. The evidence is not high level, but does support the limited previous evidence. Further research is needed to confirm the efficacy of this treatment combination. This case study, along with previously published evidence, suggests that the combination of extension-based exercises and lumbar mechanical traction may be beneficial for treating appropriate patients with a lumbar disc herniation

Inconsistencies in fitness-to-drive recommendations in patients with neurological diseases

Sarah Morrison, Alexandra Salch, Joey Taylor, Hannes Devos
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Introduction

- Alzheimer's Disease (AD), Amyotrophic Lateral Sclerosis (ALS), and Stroke are unique neurological diseases that cause a decrease in ability to perform IADLS safely, such as driving
- The purpose of this study was to assess the agreement between recommendations of physicians and on-road assessors regarding fitness-to-drive following diagnoses of AD, ALS, and Stroke
- Hypothesis: There will be discrepancies between the physicians' and on-road assessors' fitness-to-drive recommendations

Methods

- Physicians and on-road assessors provided a fitness-to-drive recommendation, which could be favorable, reserved, or unfavorable
  - Favorable recommendation if deemed fit to drive with or without car adaptations and with no driving restrictions
  - Reserved recommendation if allowed to continue driving with one or more restrictions
  - Unfavorable recommendation if deemed unfit to drive
- Patient demographics, information regarding previous driving record, and interval since diagnosis can be seen in Table 1

Data Analysis

- Normality of variables was investigated using Kolmogorov-Smirnov test
- T-test used to assess differences in normally distributed variables
- Wilcoxon Rank-sum test used for unevenly distributed variables
- Inter-rater reliability was found using percentage agreement (p0), PABAK and weighted kappa tests
- Nominal variables were assessed using the Chi Square test (AD and Stroke) and the Fisher Exact test (ALS)

Variable	Patients (n=641)		
	AD (n = 68)	ALS (n=18)	Stroke (n=555)
Age, y	79 (76-83)	54 (49-66)	64 (53-73)
Sex, male	55 (81)	15 (83)	407 (73)
Time interval since dx, years	1 (1-2)	1 (0-1)	1.39 (.58-3.6)
Driving experience, y	46 (45 – 46)	34.5 (32.5-41.5)	40 (28-45)
Car crashes in past 5 years, n	0 (0-0)	0 (0-0)	0 (0-0)
Traffic violations in past 5 years, n	0 (0-0)	0 (0-2)	0 (0-0)

Table 1: Patient Demographics and Driving Characteristics

Results

- The physicians and on-road assessors were found to agree on the recommendation of fitness-to-drive in patients with AD, ALS, and Stroke 43%, 58% and 74% of the time respectively (Figure 1)
- In cases where the physicians and on-road assessors disagreed on the recommendation of fitness-to-drive, the percentage of patients that were overestimated by the physicians can be found in Figure 2
- The percentage of those underestimated by the physicians can be found in Figure 3

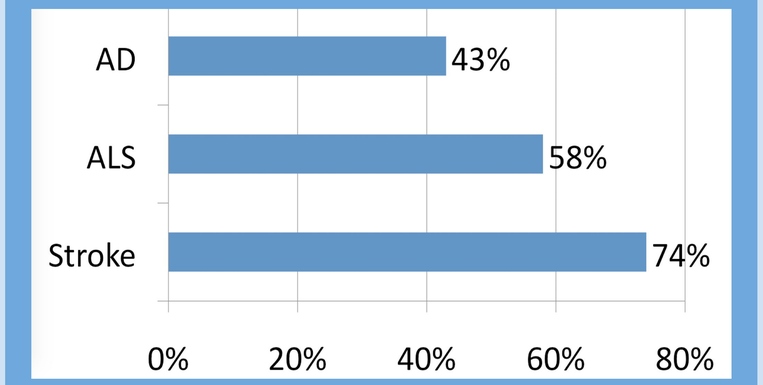

Figure 1: Agreement between physician and on-road assessor recommendation

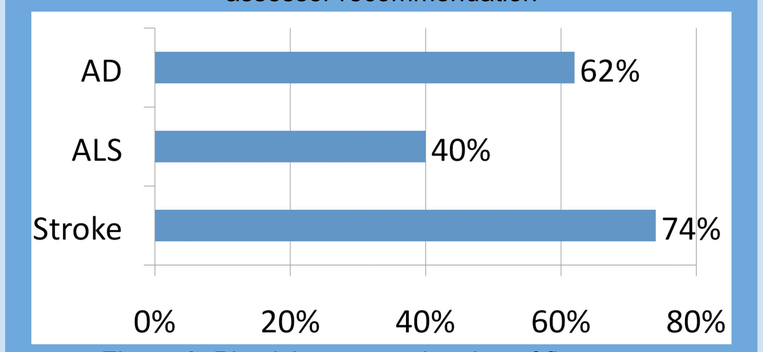

Figure 2: Physician overestimation of fitness-to-drive

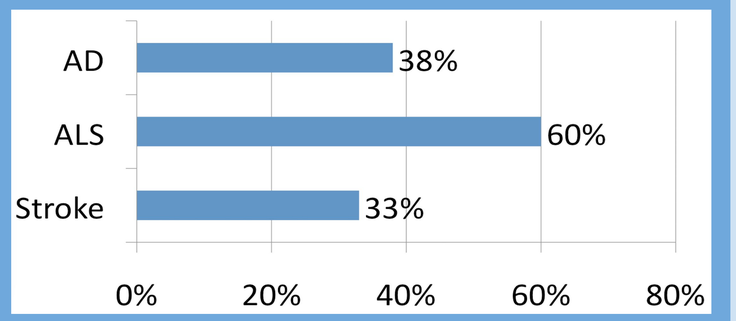

Figure 3: Physician underestimation of fitness-to-drive

Discussion

- We found moderate agreement between fitness-to-drive recommendations made by physicians and on-road assessors in patients with stroke or ALS and a low agreement between physicians and on-road assessors in patients with AD (see Figure 4)
- Patients with AD were also less likely to receive a favorable recommendation in comparison to Stroke or ALS
- The tendency towards overestimation of fitness-to-drive in patients with stroke could be due to physicians feeling more comfortable both with younger patients and patients that have had a longer time interval since diagnosis
- The tendency towards lower agreement in patients with AD could be due to those with AD having fewer physical impairments and having cognitive impairments that may not be apparent in a short visit with the physician. Patients with AD also have a higher mean age (see Table 1).
- The tendency towards underestimation in those with ALS could be due to the progressive nature of their disease and the reluctance of physicians to accept the liability of providing a favorable fitness-to-drive recommendation in a less commonly encountered disease population
- The results suggest that using the physicians' recommendation alone could put individuals on the road that are not fit to drive

Figure 4: Disagreement between physician recommendation and on-road decision

Conclusion

- Our hypothesis that there will be discrepancies between fitness-to-drive recommendations between physicians and on-road assessors was proven to be accurate through the results of the study
- We can assume from these findings that the physicians' fitness-to-drive recommendations are not accurate enough to be autonomous, especially in patients with AD
- There was a much higher percentage of agreement between physicians and on-road assessors in patients with stroke likely due to the likely positive progression in this population as opposed to ALS and AD which result in a decline of physical and/or cognitive status

This poster design is adapted from "Matthew Allgood, BBA, SPT; Mallory Pilcher, BS, SPT; Angela Stout, BS, SPT; Jahan Threeths, BS, SPT; Miriam Cortez-Cooper PT, Ph.D. Alter-G® Training Following a Total Knee Replacement" located at http://www.georgiahealth.edu/alliedhealth/pt/research.html.

Wii Balance and Alter-G Intervention Effects on Post Stroke Rehabilitation

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INTRODUCTION

Every 40 seconds, someone in the United States has a stroke. Every 4 minutes, one American loses his or her life due to stroke. For the survivors, stroke is a leading cause of long-term disability. Individuals who have experienced a stroke most commonly see declines in motor, sensory, and cognitive domains of function, which can lead to severe restrictions from normal activities of daily life. With impairments in these specific areas, gait and balance is frequently affected and restricted after a stroke. These restrictions can lead to falls and considerable functional limitations. Therefore, post-stroke rehabilitation is extremely important in helping stroke survivors become as independent as possible and attain the best possible quality of life. That is where the *Alter G*® becomes an innovative option that could improve the effectiveness of rehabilitation following a stroke. The *Alter G*® is a type of body weight supported treadmill which allows the gait rehabilitation process to begin much sooner while still maintaining regards for safety. While *Alter G*® is a relatively newly introduced therapeutic intervention, the *Wii Balance Board*™ has been used to treat patients for nearly a decade. It allows patients to play games that simulate the body movements of an individual during play activities that require balance. The *Wii Balance Board*™ has been the subject of many research studies and is commonly seen in many rehabilitation facilities.

PURPOSE

Our study sought out to compare the functional outcome measures after treatment of the *Wii Balance Board*™ and the *Alter G*® Anti-Gravity Treadmill® in individuals who had experienced a stroke in the previous 6 months.

PARTICIPANT

- 75 year old Caucasian male
- Left sided CVA 4 months prior
- PTH: Hypertension
- Lives alone
- Primary method of locomotion: Wheelchair

OUTCOME MEASURES

- TUG
  - Assesses mobility, balance, walking ability, and fall risk in older adults
  - Average time of 3 trials to rise from chair walk 6 meters and return to chair
- 6MWT
  - Sub-maximal test of aerobic capacity/endurance
  - Measurement of distance covered in 6 minutes time
- 10 MeterWT
  - Assesses gait speed in meters per second
  - Average time of 3 trials to walk 10 meters

INTERVENTIONS

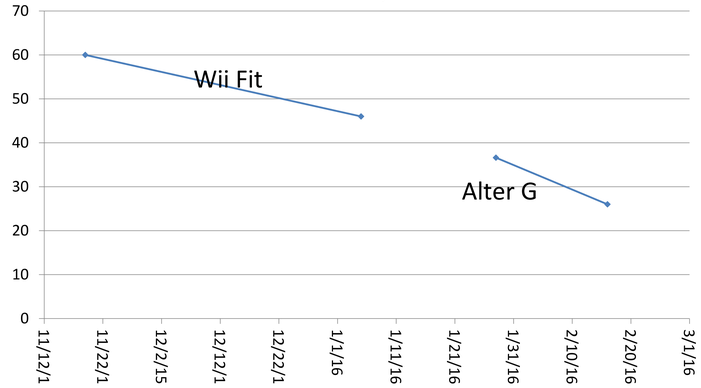
- *Wii Balance Board*™
- 9 Sessions over a period of 3 weeks
- Games Played: Wii Fit Body Test, Table Tilt, Balance Bubble, Penguin Slide, Soccer Heading, and Ski Jump
- Wii Fit Yoga Training: Deep Breathing Pose, Warrior Pose, Half-Moon Pose, and Spine Extension Pose
- Games promoted balance, weight shifting, and utilizing the stroke affected side
- Exercises progressed by increasing game complexity, increasing repetitions, and having patient narrow their base of support
- Target heart rate for this intervention was also 40%-60% heart rate reserve

16 Day period of no treatment

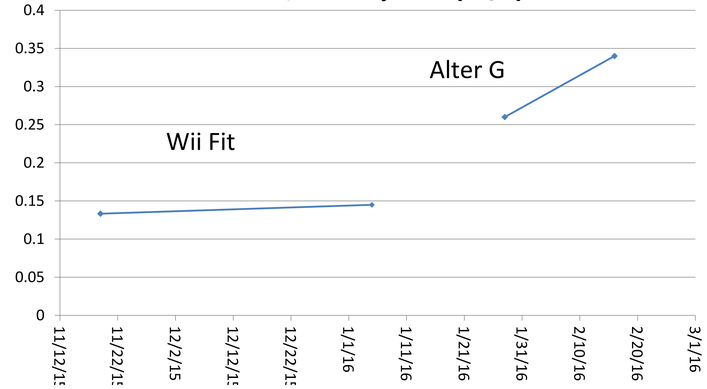
the *Alter G*® Anti-Gravity Treadmill

- 2 Sessions over a period of 3 weeks
- Protocol: Began at 80% BW support and .2 mph speed, progressed to 50% BW support and .5 mph speed
- 1 minute breaks instilled as needed, HR and BP recorded
- HEP given between sessions for motivational and fitness benefits

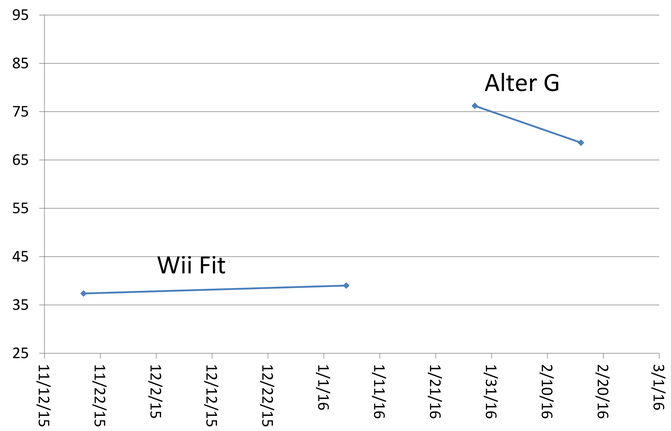
TUG, s



10 MWT, Gait Speed (m/s)



6 MWT, m



CONCLUSIONS

- Following the *Wii Balance Board*™ treatment, our patient, improved his balance and muscular endurance to a level that allowed him to become a functional household ambulator and he continued to improve as he discontinued use of his wheelchair inside his home.
- During the period of *no treatment*, the participant utilized improved balance confidence and motivation in performing his HEP to improve his 6MWT and 10MWT gait speed.
- While there was not a *statistically* significant improvement in any of the outcome measures, the chosen interventions propelled the participant to a higher level of physical function and performance which allowed him to participate in a greater amount of ADLs and individualized tasks of daily life.

Return to Driving After Concussion

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Introduction

- Mild Traumatic Brain Injuries (mTBIs) are a common injury sustained in collegiate level athletics[1].
- An estimated 300,000 sports-related mTBIs occur annually in the US[1].
- While awareness continues to increase, less is known on the effects of mTBIs on the ability to operate a motor vehicle[2].
- Methods of assessment have been used to evaluate an individual's fitness to drive[2].
- 40% - 60% of individuals return to driving immediately after concussion[3].
- Driving requires a combination of motor skills, cognitive skills, and reaction time[4].
- The aim was to investigate if individuals with resolved symptoms following a concussion would demonstrate lingering deficits on a neuropsychological test battery and driving simulator assessment.

Figure 1. The computer based driving simulator

Methods

- Participants recruited through the Athletics Department at the University of Georgia, September 1, 2015 to May 1, 2016.
- Each participant required to be of driving age and possess a valid driver's license.
- Concussed group required to be diagnosed by health care professional and tested within 48 hours of self-reported symptom resolution.
- The control group were required to have no history of concussion within the last 24 months.
- Participants who sustained more than 3 concussions previously were omitted from the study.
- Each participant completed driving history questionnaire, CNS Vital Signs protocol, a neuropsychological test battery, and a computer based driving simulator assessment (See Figure 1).
- The driving simulator assessed the participants performance in a variety of scenarios (See Figures 4 and 5).

Data Analysis

- Unpaired t-tests for normally distributed ratio variables
- Wilcoxon rank sum test for ratio variables that were not normally distributed.
- Nominal data analyzed using Chi Square statistics and Fisher Exact Tests.
- Analysis performed with statistical program SAS Enterprise with P-values <0.05 considered as significant.

Results

- The study included 10 participants who had sustained a concussion along with 8 age and sex matched controls.
- The average age of all participants was 20 years old and 16 of the 18 participants included in the study were female.
- There were no significant differences between the two groups during the driving simulator assessment: Standard Deviation for average velocity in the curve 1 scenario and Standard deviation of the lateral lane position in the red-light scenario were borderline significant (See Figures 2 and 3.)
- While not significant, concussed individuals recorded more traffic violations as well as had more road edge excursions and weaving.

Table 1. Demographics, Clinical History, and Driving Characteristics

Demographics	**NCG (n=8)**	**CG (n=10)**	**Test statistic**	**p-value**
Age	20.68 (1.56)	20.04 (1.03)	1.04	0.31
Sex; female	7 (87.5%)	9 (90%)	Fisher	1.00
years of Education	13.5 (12.5-15)	13 (12-14)	W=86.5	0.37
Clinical				
TSI; days	n/a	18.25 (14.6)	n/a	n/a
HCP; yes	n/a	10 (100%)	n/a	n/a
Prior mTBI; yes	2 (25%)	6 (60%)	n/a	n/a
Corrective lens; yes	4 (50%)	2 (20%)	Fisher	0.32
Driving				
prior simulation; yes	1 (12.5%)	0 (0%)	Fisher	0.44
AADT; yes	1 (17%)	1 (11.1%)	Fisher	1.00
Years driving	4.5 (1.48)	4.5 (1.08)	t=0	1.00
Miles per Year	4500 (3000-9000)	7250 (5000-14000)	W=66.5	0.43
Accidents Prior; yes	0 (0%)	4 (40%)	Fisher	0.09
Driving Violation; yes	2 (25%)	2 (20%)	Fisher	1.00

TSI=Time Since Injury; HCP=Health Care Practitioner; AADT=Any Advanced Drivers Training;

Table 2. List of Neuropsychological Tests Used in Protocol

Neuropsychological Test	**NCG (n=8)**	**CG (n=10)**	**Test statistic**	**p-value**
PCSS 2 days (max=108)	3 (1-8)	5.5 (1-10)	W=74	0.89
PCSS 3 weeks (max=108)	6.13 (5.89)	7.10 (5.69)	W=74	0.90
TMTA, seconds	16.07 (3.19)	16.64 (2.45)	t=-0.43	0.68
TMTB, seconds	48.63 (23.22)	36.13 (7.90)	t=1.46	0.18
SDMT correct responses	65.63 (5.53)	65.6 (10.57)	t=0.01	0.99
ROCF copy ,(_/36)	33.10 (1.74)	33.10 (2.93)	t=-0.03	0.98
ROCF recall, (_/36)	23.5 (18.5-26.25)	23 (19-28)	W=73	0.83

PCSS=Post Concussion Symptom Scale; TMTA=Trail Making Test A; TMTB=Trail Making Test B; SDMT=Symbol Digit Modalities Test; ROCF=Rey-Osterrieth Complex Figure;

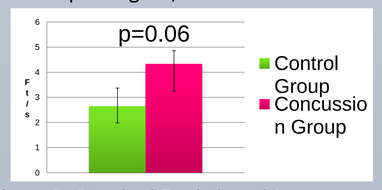

Figure 2. Standard Deviation of Average Velocity in Curve 1 Scenario.

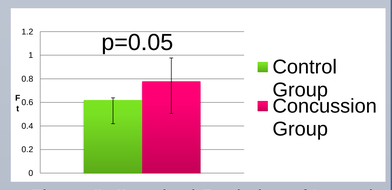

Figure 3. Standard Deviation of Lateral Lane Position in Red-light Scenario.

Table 3. Summary of Results on the Computer Based Driving Simulator

Variable	**NCG (n=8)**	**CG (n=10)**	**Test statistic**	**p-value**
Off road accidents	0 (0-0)	0 (0-1)	W=69	0.43
Number of collisions	1 (1-1.5)	1 (1-2)	W=66	0.34
Pedestrians hit	0 (0-0)	0 (0-0)	W=72	0.44
Total accident	1 (1-1.5)	2 (1-2)	W=60.5	0.17
Speed ticket	6.75 (4.23)	9.3 (5.42)	t=-1.09	0.29
Light tickets	0 (0%)	0 (0%)	W=76	1.00
Stop signs	1 (1-1.5)	1 (0-1)	W=86.5	0.32
Total tickets	7.88(4.42)	10.1 (5.76)	t=-0.90	0.38
Center Lane crossing	3 (1.5-4)	2.5 (2-5)	W=73.5	0.86
Road edge excursions	5 (4-5)	6 (4-6)	W=60.5	0.19
Total weaving	7.5 (6-8.5)	8.5 (7-16)	W=62	0.24
Correct Divided Attention	12.75 (2.87)	11.3 (4.57)	t=0.78	0.45
Incorrect Divided Attention	0.5 (0-1.5)	0.5 (0-1)	W=76	1.00
Divided Attention missed	6.13 (2.59)	7.3 (4.55)	t=-0.65	0.53
Divided Attention Reaction Time	2.85 (.52)	2.89 (0.82)	t=-0.12	0.91
Time from start	463.5 (45.40)	472.4 (53.81)	t=-0.38	0.71
Minimum distance	372.3 (102.8)	310 (124.3)	t=1.14	0.27

Figure 4. curve scenario on driving simulator.

Figure 5. Red-light Scenario on driving simulator

Conclusion

- Further research is necessary to determine a driving simulator's ability to predict return to on-road driving after a concussion.
- Future research should focus on an individual's ability to maintain lane position as well as speed while driving.
- An individual following a concussion may by at risk for increased traffic violations as well as deficits in maintaining road position despite not reporting symptoms.

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Prehabilitation for Total Knee Replacment: A Retrospective Study

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Introduction

- Osteoarthritis is the most common joint disorder worldwide. It is a disorder of synovial joints that is especially painful in load bearing joints such as the knee and hips.
- According to the Centers for Disease Control and Prevention, two in three people who are obese may develop symptomatic knee osteoarthritis at some point in their lifetime.
- Many individuals choose to undergo a total knee arthroplasty in order to regain function of their knee and more easily carry out their activities of daily living. However, many individuals with obesity also have other comorbidities that may lead to post-surgical complications and extended rehabilitation time, thus are considered at-risk patients.
- Prehabilitation (prehab) is a relatively new term that physical therapists and doctors are using to describe treatment that a patient who is preparing for surgery can undergo. It is defined as a physical and/or lifestyle preparation to improve recovery time following surgery.
- In this retrospective study we reviewed records to analyze the correlation between patient comorbidities, specifically obesity, and outcome measures to determine if incorporating a prehab program would benefit this patient population after TKA

Methods

- Twenty-one physical therapy records were gathered from patients who were Medicare insured, had no previous history of joint replacement and/or revision surgeries, were nonsmokers, and had completed a Lower Extremity Functional Scale (LEFS) questionnaire at baseline and at discharge from PT.

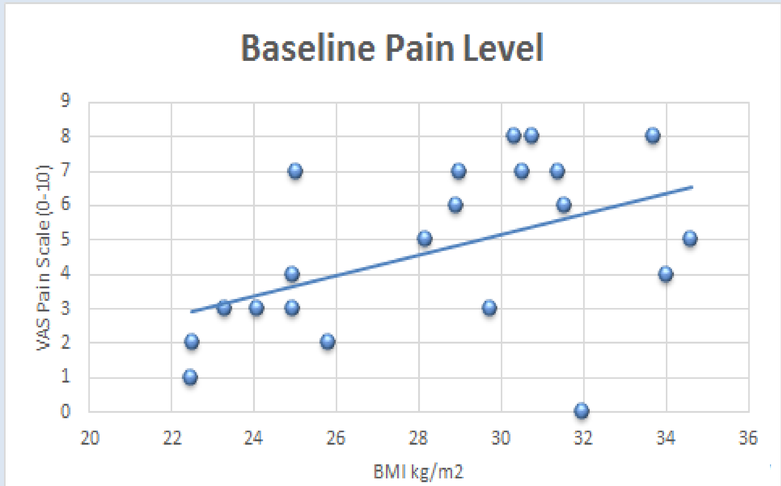
BMI Category	BMI	Baseline Pain	Baseline Knee Flexion	Baseline LEFS score
Healthy (n=6)	23.7 (+/- 1.1)	2.7 (+/- 1.03)	84.2 (+/- 13.9)	29.3 (+/- 18.1)
Overweight (n=6)	27.8 (+/- 1.9)	5.0 (+/- 2.10)	93.3 (+/- 16.2)	28.0 (+/- 11.4)
Obese (n=9)	32.1 (+/- 1.62)	5.9 (+/- 2.62)*	83.1 (+/- 12.6)	15.0 (+/- 13.3)
		p= .0139	p= .8812	p= .0992

*Outlier included in the data

Statistical Analysis

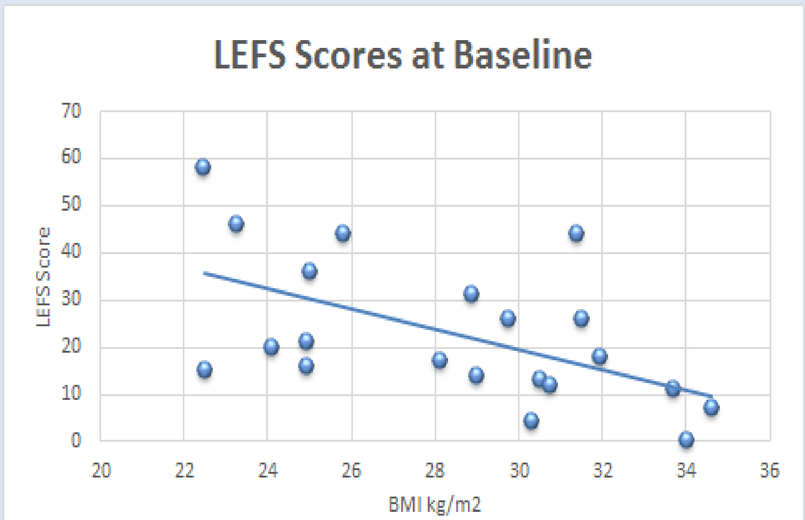
- Excel and Prism7 software was used to analyze the data.
- A Grubb's test of outliers was performed to determine if there were outliers that may skew the data. No data was deleted.
- Next, an analysis of variance was performed to analyze the difference among group means for the parameters of BMI, baseline pain, and baseline LEFS score.
- We then analyzed the correlation between BMI and pain, and BMI and LEFS score and obtained a Pearson product moment correlation coefficient to measure the linear correlation between these sets of variables.

Figure 1.



r = 0.47; P=.032

Figure 2.



r = -0.55; P=0.011

Results

- Baseline LEFS scores were considerably lower in the obese group(15+/- 13.3) in comparison to the normal weight group (29.3 +/- 18.12), indicating a greater level of disability. While not statistically significant, this difference is clinically significant (MCID=9 points).
- BMI explains 30% of the variance in the baseline LEFS (Fig. 1) .
- BMI was also moderately correlated with baseline pain level (Fig. 2)
- After the same number of PT visits, the obese and normal weight groups show a similar improvement in LEFS scores (28.3 +/- 15.91 vs. 30.9 +/- 17.45), however lower extremity function after physical therapy remained lower in the obese group, which can be explained by their lower baseline values.

Conclusion

- Although pain levels improved for all three BMI groups at discharge, the obese group continued to have more pain in comparison to the overweight and normal groups.
- individuals who are considered obese (BMI ≥ 30.0) have greater pain and decreased function when starting a rehabilitation program when compared to their lower BMI counterparts.
- These factors appear to hinder their recovery process and decrease their physical therapy progression early on in treatment.

Clinical Significance

Patients with obesity may benefit from a prehabilitation treatment plan that focuses on both weight loss and exercise acclimation prior to surgery

Acknowledgements

Peak Rehabilitation for access to their patient records

This poster design is adapted from:
1. Bagley L, Hawkes J, Chatto C. "The Effects of Alter G Anti-Gravity Treadmill Training on Spinal Cord Injury Rehabilitation" located at http://www.augusta.edu/alliedhealth/pt/researchcourse/documents/2016posters.pdf.

Core Muscle Activity During Yoga Poses In Untrained Individuals

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BACKGROUND

- Researchers have used EMG activity to quantify muscle activation during a variety of core stabilization exercises.
- Core stabilization exercise is an important treatment strategy used for rehabilitative purposes.
- Yoga has become a very popular form of exercise designed to target the core muscles (e.g., muscles of the trunk and hip).
- To date, limited information exists regarding core muscle activation during yoga poses.
- Information gained on the relative muscle activation of the core during yoga poses will provide physical therapists useful data for the development and implementation of rehabilitation programs.

PURPOSE/HYPOTHESIS

- The purpose of this study was to determine the relative activation of core muscles during yoga poses.
- We hypothesized that no significant differences will exist in the amount of muscle activation during a specific pose.

STUDY DESIGN

- Cross sectional observation study

PARTICIPANTS

- 10 healthy individuals (10 subjects; 4 males: 6 females; age = 25.1 ± 3.1 yrs; height = 174 cm ± 8.05 cm; body mass = 70.34 kg ± 8.1 kg) untrained in yoga

METHODS

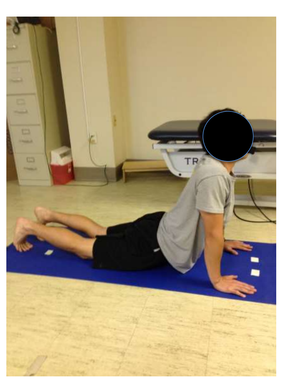
- Subjects performed maximal voluntary isometric contraction (MVIC) of rectus abdominis (RA), abdominal obliques (AO), lumbar extensors (LE), and gluteus maximus (GMX).
- Subjects performed 4 commonly prescribed yoga exercises:
  - Chair Pose
  - High Plank Pose
  - Downward Facing Dog Pose
  - Warrior II Pose
- EMG activity was collected for the RA, AO, LE, and GMX during each yoga pose.
- EMG activation for each muscle during each pose was reported as a percentage of MVIC (MVIC=100%)
- Separate 1-way ANOVA with repeated measures were used to determine differences in amplitude among poses.

YOGA POSES

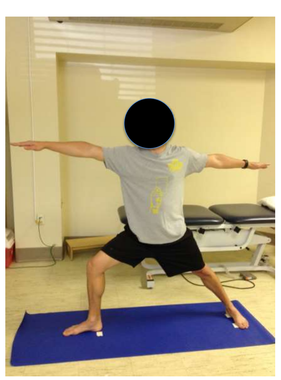
Chair Pose

High Plank

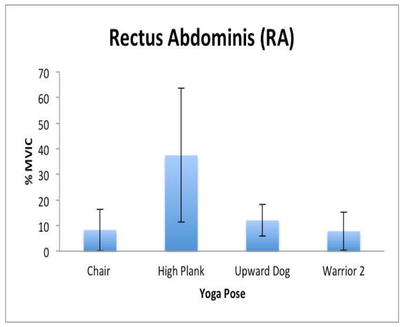
Upward Facing Dog

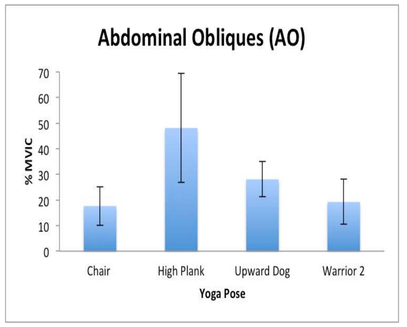


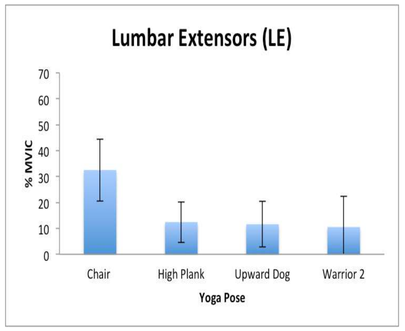
Warrior II

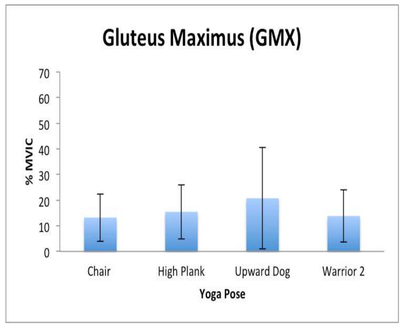


RESULTS









- Rectus abdominis (RA), and Abdominal obliques (AO) showed greatest relative activation during High Plank pose
- Lumbar extensors (LE) showed greatest relative activation during Chair pose
- Gluteus maximus (GMX) showed greatest relative activation during Upward Facing Dog pose

CONCLUSION

- For patients needing to increase activation in core musculature, specifically RA and AO, High Plank pose offers an alternative exercise to traditional crunches and diagonal crunches. Chair pose creates activation in the LE group, which can be especially beneficial to populations that are not able to get into a prone position for traditional LE lifts. For individuals needing activation of GMAX, Upward Facing Dog pose can be used in the initial phases of rehabilitation, in lieu of traditional exercises.

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