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Research Article

Comparison of Stretching Procedures in Individuals with Posterior Shoulder Tightness

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Abstract

Background & Objective: *Tightness in the posterior shoulder capsule leads to abnormal Glenohumeral biomechanics and thus leads to shoulder pain. Several methods of stretching have been described to address Posterior shoulder tightness. Controversy exists in the literature for the most effective method of stretching. Thus, this study aimed to compare the sleeper stretch and cross –body stretch techniques to improve Shoulder Internal rotation Range of motion in subjects with Posterior shoulder tightness.*

Methods: *20 subjects were taken for the study and were randomly assigned to one of the two groups: Group A (Cross body stretch, n=10) and Group B (Sleeper stretch, n=10). Subjects in both the Groups performed the stretches once daily for 5 repetitions, holding each stretch for 30 seconds. The stretching exercises were performed for 5 days a week for a total duration of 4 weeks.*

Results: *The results showed that the cross body Stretch group improved by 32.60% as compared to 15.80% in Sleeper stretch group. The percentage improvement for Cross body stretch and sleeper stretch at 2 weeks was 23.2% and 10.8% respectively. On the contrary the percentage improvement for Cross body stretch Group and Sleeper stretch Group at 4 weeks was 7.6% and 4.5% respectively.*

Conclusion: *Based on the findings of this study , it can be concluded that Cross body stretch increases the Internal rotation Range of Motion to a larger extent than the Sleeper stretch.*

Key Words: *Stretching, Shoulder Capsule, Sleeper Stretch, Cross –Body Stretch.*

Introduction

Posterior capsular contracture of the shoulder has been demonstrated as a common cause of shoulder pain in athletes. A patient with such dysfunction presents with restricted internal shoulder rotation as well as horizontal adduction.[1,2] This can cause abnormal Glenohumeral kinematics by forcing humeral head anteriorly and superiorly into the acromial arch stressing posterior shoulder structures in the follow through phases of throwing and serving. This abnormal humeral head motion has been demonstrated in a study conducted by Huffman GR et al[3]. This in turn results in a decrease in subacromial space during overhead activities. Thus, approximation of the humeral head and acromian can lead to compression of tissues in suprahumeral region. Therefore Posterior Capsule tightness is a perpetuating factor in shoulder impingement syndrome and labral lesions. Warner et al[4] also attributed the limitation of internal rotation in patients with Impingement syndrome to the Posterior capsule tightness. Similarly in a study of Myers et al[5], throwing athletes with symptomatic Internal Impingement showed reduced Glenohumeral Internal rotation and adduction as a result of posterior shoulder tightness. Thus emphasis should be given on correcting the deficit of shoulder complex Range of motion and attaining adequate flexibility prior to beginning of strengthening program to allow normal motor patterns and increase the performance of overhead athlete. Techniques or exercises to improve mobility includes passive and active assisted range of motion exercises in pain free ranges, gentle joint mobilization, passive and PNF stretching, myofascial release technique, soft tissue manipulation etc.. Amongst all these techniques, Stretching is of utmost importance in maintaining and restoring flexibility.[6] Several different methods of stretching have been described to address Posterior shoulder tightness. These include “Towel stretch” where the Glenohumeral joint is

adducted, internally rotated and extended while the hand now located behind the individual's back is pulled up by the opposite hand using a towel. Another popular stretch is "Cross body stretch" where the shoulder is elevated to approximately 90º of flexion and pulled across the body into horizontal adduction with the opposite arm. Both of these stretching procedures have been criticized because the scapula is not stabilized and therefore tissues stress is imparted to scapulothoracic tissues as well as tissues crossing glenohumeral joint.

More recently authors have described a "sleeper stretch" that is accomplished by lying on the side to be stretched , elevating the humerus to 90º on the support surface,then passively internally rotating the shoulder with the opposite arm. Other authors have also described methods where the scapula is manually stabilized by the therapist while the arm is adducted and internally rotated. This manual approach has the obvious disadvantage of requiring a therapist or second person to perform the stretch, which limits how often the stretch can be performed.

Despite the evidence from biomechanical studies suggesting that Posterior shoulder tightness may be a contributing factor to Subacromial Impingement and the recommendation of authors for prophylactic stretching, there are very less studies which compare the effectiveness of these stretching procedures for Posterior shoulder tightness. Therefore the purpose of this study is to compare the sleeper stretch and cross –body stretch techniques to improve Shoulder Internal rotation Range of motion in subjects with Posterior shoulder tightness.

Methodology

20 subjects were taken for the study and were randomly assigned to one of the two groups: Group A (Cross body stretch, n=10) and Group B (Sleeper stretch, n=10).These subjects were the students of Banarsidas Chandiwala institute of Physiotherapy, New Delhi**.** Healthy, asymptomatic individuals in the age group of 18 to 25 years with difference in passive Internal rotation Range of motion of 10 degrees or more measured at 90 degrees of shoulder abduction were included in the study. Subjects with any history of shoulder surgery, shoulder symptoms requiring medical care within past year, recent injury to the shoulder and any musculoskeletal / neurological pathology in upper and lower limb were excluded from the study.

Subjects in Group A (Cross body stretch group) performed cross body stretch in sitting position. For this, the subject took the shoulder into elevation to approximately 90 degrees of flexion with the elbow flexed and then pulled it across the body into horizontal adduction with the opposite arm.

Figure 1 : *Subject performing Cross Body Stretch*

Subjects in Group B (Sleeper stretch group) performed sleeper stretch in side lying position. For this, the subject took the shoulder into elevation to approximately 90 degrees on the support side and passive internal rotation of the supported shoulder was done with the opposite arm.

Figure 2 : *Subject performing Sleeper Stretch*

Subjects were asked to perform stretching exercises to a point of mild discomfort on more limited side only. They performed the stretches once daily for 5 repetitions, holding each stretch for 30 seconds. The stretching exercises were performed for 5 days a week for a total duration of 4 weeks.

Results

The results showed that the cross body Stretch group improved by 32.60% as compared to 15.80% in Sleeper stretch group. The percentage improvement for Cross body stretch and sleeper stretch at 2 weeks was 23.2% and 10.8% respectively. On the contrary the percentage improvement for Cross body stretch Group and Sleeper stretch Group at 4 weeks was 7.6% and 4.5% respectively.

Table–1: Comparison of Pre and Post intervention measures (at 2 weeks) between two experimental groups; Group A (Cross Body Stretch Group) and Group B (Sleeper Stretch Group)

VARIABLE	GROUP A				GROP B			
	Pre	At2 Weeks	Mean Difference	Percentage improvement	Pre	At2 Weeks	Mean Difference	Percentage improvement
	X(S.D.)	X(S.D.)			X(S.D.)	X(S.D.)		
Range of Motion (ROM)	53.3 (5.96)	65.7(4.24)	12.4	23.20%	55.5(5.5)	61.5(4.94)	5	10.80%

Table–2: Comparison of Pre and Post Intervention measures at 2 and 4 weeks between two experimental groups; Group A (Cross Body Stretch Group) and Group B (Sleeper Stretch Group)

VARIABLE	GROUP A				GROP B			
	At2 Weeks	At2 Weeks	Mean Difference	Percentage improvement	At2 Weeks	At3 Weeks	Mean Difference	Percentage improvement
	X(S.D.)	X(S.D.)			X(S.D.)	X(S.D.)		
Range of Motion (ROM)	65.7 (7.24)	70.7(4.47)	5	7.60%	61.5(4.94)	64.3(4.49)	2.8	4.50%

Table–3: Comparison of Pre and Post Intervention measure at 0 and 4 weeks between two experimental groups; Group A (Cross Body Stretch Group) and Group B (Sleeper Stretch Group)

VARIABLE	GROUP A				GROP B			
	At0 Weeks	At4 Weeks	Mean Difference	Percentage improvement	At0 Weeks	At4 Weeks	Mean Difference	Percentage improvement
	X(S.D.)	X(S.D.)			X(S.D.)	X(S.D.)		
Range of Motion (ROM)	53.3 (5.96)	70.7(4.47)	17.4	32.60%	55.5(5.5)	64.3(4.49)	8.8	15.80%

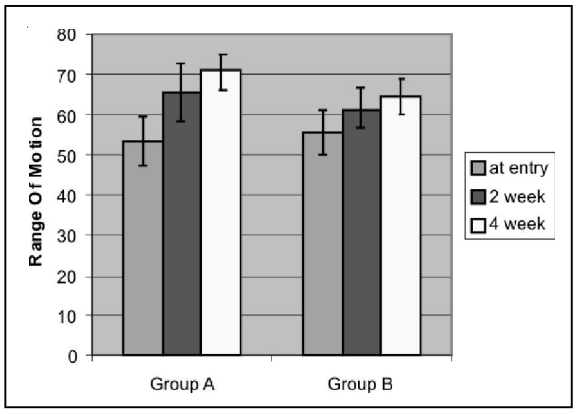

Figure 3: Comparison between Pre and Post Intervention measures at 0, 2 and 4 weeks between Group A(Cross body stretch group) and Group B(Sleeper stretch group)

Discussion

It was found in the study that there was not much Significant Difference in Pre-intervention mean values of outcome measures of shoulder Internal rotation Range of Motion between both the Experimental groups: Group A (Cross body stretch group) and Group B (Sleeper Stretch group).This indicates the similarity of both the groups with respect to studied variables at the beginning of the study.

The results of the study showed that stretching of tight Posterior shoulder structures leads to an improvement in Passive Internal rotation Range of Motion. The stretch in both the groups was performed for duration of 30 seconds and was repeated 5 times. As 30 seconds time is enough to maintain the stretch, it may be a reason for improvement in range of motion. It can be attributed to the fact that a sustained stretch for a prolonged time habituates the muscles spindle making it accustomed to a new length thereby reducing its signaling to spinal cord.

The possible reason for increase in Internal rotation Range of Motion following stretching could be that the applied stretch force is transmitted to the muscle via connective tissues. When muscle stretches, the accompanying connective tissue also undergoes a stretch. Connective tissues are viscoelastic structures i.e. they constitute primarily of non elastic collagen fibers combined with a small amount of elastic tissue. This viscoelastic property of the tissue allows its lengthening and elongation during a stretch. If this stretch force is maintained for a longer duration, it results in plastic deformation of connective

tissue causing a permanent increase in the length due to development of a creep.

The finding of this study is supported by those of Sauers E. August et al.[7] They Reported that a routine Fauls Modified stretching procedure done on throwing shoulders of collegiate baseball players displayed a significant increase in Glenohumeral Internal rotation range of motion. Another study done by Joseph B Myers et al[5] suggested that stretching helps to restore flexibility of posterior shoulder structures in throwers with posterior shoulder tightness.

Our data also showed that cross body stretch performed in Group A was more effective than Sleeper stretch given in Group B in improving Glenohumeral Passive Internal rotation range of motion. This finding is somewhat surprising given that the stabilization of the scapula as performed with sleeper stretch would seem to enhance the effectiveness of stretching for the posterior shoulder region. But it may be hypothesized that Cross body stretch provides a greater amount of stretch force on the posterior aspect of the shoulder since it involves adducting the arm across the chest. On the other hand, a Sleeper stretch may localize the stretch force to the structures on postero-superior aspect of the shoulder. Philip W Mclure[8] reported a compliance of 89% for the cross body stretch as compared to 81% for sleeper stretch in a study. He also reported that sleeper stretch was more painful to perform as compared to cross body stretch. He hypothesized that subjects performed sleeper stretch less intensely and for less time because of the pain or the inconvenient position required. This may be the possible reason for less improvement shown by sleeper stretch in our study. This finding of our study is supported by Philip W Mclure[8] who also found that Cross body stretch in individuals with limited Shoulder Internal Rotation Range of Motion is more effective then Sleeper stretch.

Another finding from our data interpretation, showed a marked improvement in Glenohumeral passive Internal Rotation Range of Motion in first 2 weeks as compared to an increase in 2nd to 4th week. Based on this finding it could be proposed that a 2 week stretching protocol in both the experimental groups is quite effective in gaining improvement in Glenohumeral passive internal rotation range of motion. Thus it is beneficial to incorporate a 2 week stretching protocol in the management of posterior shoulder tightness as it will produce almost some improvement as that of a 4 week protocol.

Based on the findings of this study, it is recommended that Cross body stretch should be practiced by asymptomatic individuals to prevent future risk of secondary complications of posterior shoulder tightness. It should be routinely followed by overhead throwing athletes to minimize the risk of shoulder Impingement or Labral lesions.

It is recommended that future studies should be conducted on patient population (e.g. Impingement syndrome, shoulder tendinitis) to ascertain the efficacy of these stretching maneuvers.

Conclusion

Based on the findings of this study , it can be concluded that Cross body stretch increases the Internal rotation Range of Motion to a larger extent than the Sleeper stretch .Thus the experimental hypothesis “Cross body stretch is effective than Sleeper stretch in improving Glenohumeral Passive Internal Rotation Range of Motion” holds true.

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Comparative Effects of Aerobic Training, Resistance Training and Combined Training on Blood Glycemic Levels and Quality of Life in Type 2 Diabetes Mellitus Patients

Research Article

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Abstract

Background *Previous trials have evaluated the effects of aerobic training alone and of resistance training alone on glycemic control in type 2 diabetes, as assessed by HbA1C values. However, few studies have assessed effects of combined aerobic and resistance training compared with either type of exercise alone.*

Purpose*: To assess the impact of aerobic training, resistance training and /or combined training on HbA1C and quality of life in type 2 diabetes mellitus patients.*

Design*: Experimental study design*

Methods: *Total number of fifty seven, type 2 diabetes mellitus subjects with the mean age (S.D) of 40.35±3.55 years were randomly assigned into groups, using permuted block randomization list generated by SAS 9.1 version. Subjects were evaluated with Physical Activity Readiness Questionnaire (PAR-Q) and Physical Activity Readiness Medical Examination (as approved by the physician).Group A (n=13) received aerobic training, Group B (n=15) received resistance training, Group C (n=14) received combined training and Group D (n=15) served as control group. HbA1C values & ADDQoL scores were taken at baseline and at end of 8th week.*

Results: *Data analysis was performed using the software package SAS 9.1 for windows version. The absolute change in mean values of HbA1C was by -0.53 ± 0.14 %(p<0.0001), -0.50 ± 0.053 %(p<0.0001), -0.71 ± 0.10 % (p<0.0001) & 0.02±0.12 %(p>0.05) in aerobic, resistance training, combined training & control group respectively. The absolute change in a mean scores of ADDQoL was by 8 ± 2.27(p<0.0001), 7.93 ± 6.59(p<0.05) , 9.28 ± 3.29(p>0.0001) & -3.33±9.53. (p>0.05) in aerobic, resistance training & combined training & control group respectively.*

Limitations: *Sample size was small. Though all participants were on regular dose of medications, there was no control over the medication. Participants in the combined group exercised for longer periods than participants in the other exercise groups, which might have been one of the reasons of the combined training group showing better results. Follow-up of 2 weeks was not enough to measure the carry over effects of interventions.*

Conclusion*: Appropriately prescribed and supervised combined training i.e. aerobic and resistance training is feasible and more effective, in reducing blood glycemic values and exercises also results in improvement in quality of life in type 2 diabetes mellitus, in Indian population.*

Key-words*: Exercises, Blood Glycemic Levels, Quality of Life, Type 2 Diabetes Mellitus.*

Introduction

India leads the world with largest number of diabetic subjects earning the dubious distinction of being termed as "Diabetes Capital of the World".[1] In India, it is estimated that this deadly disease affects presently 19.4 million individuals, which is likely to go up to 57.2 million by the year 2025.[2] Diabetes is the single most important metabolic disease which can affect nearly every organ system in the body.[2] Individuals diagnosed with diabetes sustain a significant reduction in life expectancy and quality of life.

Systematic reviews found that structured aerobic exercise (walking, jogging, or cycling) or resistance exercise (weightlifting) reduced the absolute HbA1C value by about 0.6%.[5,6] The HbA1C value reflects the mean plasma glucose concentration over the previous 2 to 3 months. A 1% absolute decrease in HbA1C value is associated with a 15% to 20% decrease in major cardiovascular events and a 37% reduction in micro vascular complications. Study by Cuff. et al (2003) that compared combined (aerobic, and resistance) training with aerobic training alone found no difference in HbA1C values between the groups.[4] Recent study conducted by Ronal J. Sigal (2007) assessed the effects of combined, aerobic or resistance training compared with either type of exercises alone, found combined exercise group having better glycemic control over aerobic/resistance alone.[6] Although, generally appreciated as the primary goal of diabetes care, patient's QoL is most often not monitored systematically as an integral part of diabetes routine control, as recommended by WHO.[3]

Report published by Subbbaiah Arunacahlam et al concluded that diabetes growth is particularly strong in India, China, and recommended the need to strengthen their research capabilities in this area.[7]

Thus, owing to scarcity of literature, the present study was conducted to find out the comparative effects of aerobic exercises, resistance exercises and combined exercises in reducing blood glycemic levels (as measured by HbA1C); and improving quality of life (as measured by ADDQoL questionnaire) in type 2 diabetes mellitus.

We hypothesized that there would be significant difference in the effects of the different modes of exercise training in improving glycemic level (as reflected by reduced HbA1C) and increasing quality of life (as reflected by increased ADDQoL scores) in type 2 diabetes mellitus patients.

Methods

Design: We conducted a total of 8 week study (6week training program, 2 week follow-up), experimental study with a parallel-group design. A sample of sixty subjects with controlled type2 diabetes mellitus, were randomly assigned to 1 of 4 groups;15 in each: aerobic training, resistance training, combined training and control group. Randomization was done by permuted block randomization list generated by SAS 9.1 version. An informed consent was taken. All patients were evaluated thoroughly using an Evaluation Performa.

Participants: Previously inactive & overweight participants (BMI of 25-29.9 kg/m^2) with type 2 diabetes mellitus in the age group of 35-46 years, were recruited from the communities of Faridabad & Noida region of Haryana, India. Study was conducted at Health Way Clinic in Faridabad & fitness paradise in Noida. Subjects were evaluated with Physical Activity Readiness Questionnaire (PAR-Q) and Physical Activity Readiness Medical Examination (as approved by the physician). Inclusion criteria included type 2 diabetes (as defined by the American Diabetes Association 2007) for more than 6 months and a baseline hemoglobin A1C value of 6.6% to 9.9% (normal range, 4.0% to 6.0%).Participants had been on a stable regimen of oral hypoglycemic diabetes agents for at least 2 months before recruitment. Exclusion criteria were uncontrolled hyperglycemia,taking insulin therapy, had participation in regular exercise program during previous 6 months, history of hypertension ($\geq$160 / 95 mg/dl), any orthopedic problems like arthritis, lower limb problems, shoulder problems that limit the activity levels to be performed in exercise session, any associated co-morbidity like cardiac or pulmonary disease, neurological problem like significant cognitive deficit, presence of peripheral vascular disease, severe peripheral neuropathy, cigarette smokers / alcoholic & uncooperative patients.

Dietary counseling was given to all participants by dietician to minimize dietary variability among groups, according to Indian Council of Medical Research. Patients were provided with handouts containing information how to cope up with low blood sugar, fluid intake and foot care, according to ADA /ACSM joint position statement (1997). Prior to exercise if the blood glucose levels were $\geq$ 240 mg/dl, exercise session was not carried out on that day. If the blood glucose before exercise was $\leq$ 100 mg/dl, a snack with 25 g carbohydrate & 7 g protein was provided, according to dietary snack recommendation before exercise by American Diabetes Association.

Intervention: The study program included 18 sessions in total, & three one hour session each week. Each training session was performed on 3 alternate days per week. Aerobic training group participants exercised on treadmills. Each aerobic training session consisted of warm up, aerobic treadmill walking, cool down. Warm up and cool down was done on treadmill only. The starting speed of treadmill was kept at 0.8 km/hr. Speed was increased gradually and minimally without resistance till aerobic

phase and decreased from raised levels in cool down to reach the pre exercise levels. The increase or decrease in speed was kept subjective and was correspondent to achieve desired pre set RPE scale range for each phase of aerobic exercise. Light intensity aerobic exercises i.e. RPE ratings of <10 (heart rate safe limit: < 35% of HRmax) was set for warm up phase. HRmax was obtained from 220-age.

Each subject exercised within moderate level of RPE ratings 11-13 which corresponds to a moderate exercise intensity of about 55-69% of HRmax, as recommended by the ADA (2004) for individuals with type 2 diabetes. In cool down phase, intensity was gradually decreased to meet pre exercise levels. The duration of whole phase was kept for 40 - 45 minutes. The duration of warm-up and cool down was kept between 10-15 minutes. The duration of aerobic phase was kept for 15 minutes; gradually increased by one minute after every 2nd session, keeping whole duration constant.[8]

Participants in resistance training group exercised using free weights and free dumbbells. Each resistance training session consisted of warm up, resistance training and cool down. Warm up and cool down period was of 15 minutes each. Initial 5 minutes were for active exercises, followed by 10 minutes of stretching of all the major muscle groups used in the training. Static stretching was repeated four times for each muscle groups, held for appropriate 15 sec. Rest period of 10 second was there between the stretches.[8]

Subjects were tested for one repetition maximum quadriceps, hamstrings, biceps, and triceps strength. The one repetition maximum was defined as the maximum amount of resistance that could be moved through the full range of motion of an exercise for no more than one repetition.[9] After two to three progressive warm up sets, sets of one repetition maximum were completed with increasing loads until two consecutive unsuccessful trials occurred at a given weight. The last successful weight lifted was determined to be one repetition maximum. Subjects rested 1-2 minute between maximal attempts.

Each combined training session consisted of aerobic training and resistance training performed on the same day. Session was started with aerobic training and ended with resistance training. Each training session had a minimum of 10 minutes but no more than 20-minute rest between exercise sessions. Subjects performed aerobic and resistance exercises in the same manner as discussed for AT & RT. Duration of this group was 70-90 minutes.

Participants included in control group were not given any exercise. HbA1C & ADDQoL were obtained at baseline and at 8th week.

Outcome & measurements

1. Glycated Hemoglobin (in %)

   A high-pressure liquid chromatography Alfa Wassermann PDL- 951 analyzer using EDTA performs Glycated hemoglobin assay.

2. The Audit of Diabetes-Dependent Quality of Life (ADDQoL-19)

The ADDQoL -19 is an individualized questionnaire measure to assess the impact of diabetes on quality of life. The ADDQoL allows the respondent to indicate aspects of life which are not applicable to them, rate the amount of impact of diabetes, positive or negative, on the applicable aspects of life, and rate the perceived importance of each applicable aspect of life for their quality of life. ADDQoL scores remain unaffected by co-morbidity. They are affected by diabetes related complications but not by unrelated conditions. License agreement between author Prof. Clare Bradley & investigator Prof. G.L Khanna and Ms Tanuj Arya was drawn for the use of English and Hindi version of ADDQoL-19 in this study from Royal Holloway, University of London, UK.

HbA1C & ADDQoL were taken at baseline and at the end of 8th week for all 60 patients included in the study.

Results

Data analysis was performed using the software package SAS 9.1 for windows version. Test of normality was done to evaluate normal distribution of data. All variables were normally distributed. All variables i.e. glycemic levels, quality of life, blood sugar levels & BMI were analyzed at baseline and at the end of 8th week. Pearson's correlation coefficient was used to find relationship between HbA1C and ADDQoL.

With-in group and between group comparisons was done using related t-test and one-way ANOVA respectively. If ANOVA showed significant changes then, post hoc comparison was performed. The significance level set for this study was 95 % ($p<0.05$).

Out of 69 patients initially enrolled for training programs, 9 did not meet the inclusion criteria and 2 of them further dropped because they refused to participate in the study. There is no statistically significant difference in the baseline characteristics between the groups.($p>0.05$) No adverse events were reported during whole study period. Only four patients reported not more than two episodes of hypoglycemia during the study time line.

Table 1.: Change In HbA1C Values (In %)

GROUP	Mean ± S.D.		T - Value
	Pre Training	Post Training	
AT	7.93 ± 0.84	7.40 ± 0.87	-12.81*
RT	7.88 ± 0.64	7.38 ± 0.64	-36.23*
AT+ RT	7.93 ± 0.87	7.22 ± 0.83	-26.02*
CG	7.86 ± 0.81	7.89 ± 0.80	0.81$^{N.S}$

Analysis of variance showed that changes between the groups in the values of HbA1C were statistically significant. ($p<0.0001$). Post hoc comparison revealed that changes in HbA1C values in aerobic & resistance training group were not significantly different ($p>0.05$) but changes in combined training group as compared with either type of exercise alone were significantly higher ($p<0.05$).

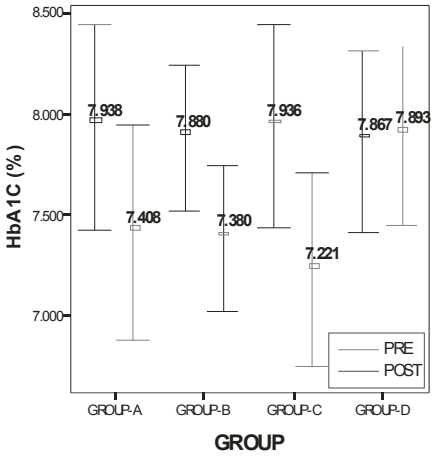

Figure 1. Change In HbA1C Values (In %)

Change in ADDQoL Scores

ADDQoL scores improved significantly from the baseline in aerobic training, resistance training, and combined group. ($p<0.0001$)

Table 2.: Change in ADDQoL Scores

GROUP	Mean ± S.D.		T - Value
	Pre Training	Post Training	
AT	-98.62 ± 23.55	-90.62 ± 23.18	12.69*
RT	-100 ± 23.75	-92.20 ± 24.18	4.66*
AT+ RT	-99.43 ± 23.92	-90.14 ± 24.48	10.56*
CG	-103.40 ± 24.46	-106.73 ± 25.76	-1.35 $^{N.S}$

Analysis of variance showed that changes between the groups in the quality of life scores was statistically significant between the groups. Post hoc comparison revealed that there was no significant change between groups ($p>0.05$), but it is statistically significant with control groups ($p<0.05$).

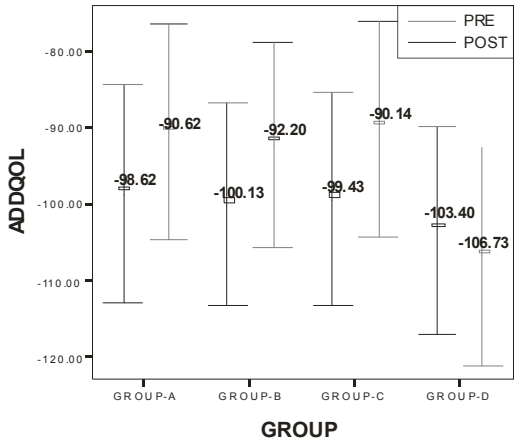

Figure 2.: Change in ADDQoL Scores

Correlation Between Blood Glycemic Levels & ADDQoL

Correlation between change in HbA1C values and change in ADDQoL scores in all the exercise groups. Pearson's Correlation Coefficient is not statistically significant. Changes in HbA1C values are not correlated with changes with ADDQoL.

	Change in ADDQoL			
	AT	RT	AT+RT	CG
Change in HbA1C	r=0.196	r=0.141	r=0.104	r = -0.302

Discussion

Owing to the dearth of literature, the comparative effectiveness of aerobic, resistance and combined training on blood glycemic levels and quality of life in type 2 diabetes is still not clear. So, the present study was designed to examine the effects of different modes of training programs on blood glycemic levels (as assessed by HbA1C) and quality of life (as assessed by ADDQoL questionnaire) in type 2 diabetes mellitus.

Improvement in HbA1C Levels:

The patients who underwent aerobic and resistance training showed decrease in HbA1C by a mean value of -0.53 ± 0.14 % & -0.50 ± 0.053 % respectively, whereas those who were given combined training showed decrease in HbA1C values by a mean value of -0.71 ± 0.10 % ,

which is significantly higher than in other groups ($p<0.0001$). The reduction in HbA1C values in combined training was more than that seen in patients who were given either aerobic or resistance training alone.

The above findings are in accordance with the recent reviews stating change in HbA1C to exercise training and found a modest response (0.5-1%).[10] A meta analysis of 14 trials (11 RCTs with 504 participants) of physical activity interventions lasting for 8 week or more found that exercise training reduced HbA1C levels among middle aged diabetic individuals.[11] A Cochrane collaboration review (2007) on 14 randomized control trials, included studies ranging from 8 weeks duration to one year, the decrease in glycated hemoglobin (0.8%) was more pronounced in shorter duration studies.[5]

Aerobic & resistance training have similar effects on glucose tolerance. However, the mechanism of this effect differs:

Aerobic training acts through qualitative changes in skeletal muscle (fiber type & metabolic capacity), whereas resistance training acts through quantitative changes in skeletal muscle (muscle mass and fiber diameter). Therefore, aerobic exercise may modify the insulin action of each fiber without increasing fiber size, whereas, resistance exercise may not alter insulin action on single fibers, but rather may improve glucose uptake by increasing the size of each fibers, which increases the muscle mass available to handle a glucose load.[12]

One more possible explanation for this improvement may be glucose uptake is partially dependent upon skeletal muscle blood flow, as training induces vasodilation of vessels, which may contribute to the improved vasodilator function, in turn improves glycemic control, and vice versa.[13]

Patients who performed combined training resulted in greater improvements in glycemic levels than either exercise alone which can be attributed to improvement in both oxidative glucose uptake and non-oxidative glucose disposal.[4,14]

Combination of aerobic training and resistance training might have additive effects due to the complementary mechanism of aerobic & resistance training. The findings of the present study are consistent with this.

Studies on combined training have shown reduction in hemoglobin A1C values by about 0.9%.[4,15,16] Dunstan et al reported no significant changes in HbA1C after 8 weeks of training, but the present study had shown significant decrease after 8 weeks of training. The confliction in the results could be due to the fact that mean age of participants' was less in the present study i.e. (40.35 $\pm$ 3.55 yrs) as compared to (51.1 $\pm$ 2.2 yrs) and also mean duration of illness of diabetes was less (2.67 $\pm$1.0 vs. 5.3 $\pm$ 1.4 yrs).[9]

Improvement In Quality of Life:

The present study deeply assessed effects of different modes of exercises on quality of life of diabetic patients using ADDQoL. The results of the present study achieved the aim to improve the quality of life, in diabetes subjects in exercises groups, and improvements in quality of life was equal between the groups.

There exists correlation between quality of life and prediction of future complications.[17] More negative impact of diabetes on patient's life, more the chances of occurrence of complications. We found that diabetes has impact that is more negative on life; therefore, diabetic patients are more prone to developing diabetes related complications. Our results showed great improvements in quality of life suggesting the reduction in the future complications related with diabetes.

The previous researchers who have studied the effect of different type of exercise on quality of life have used questionnaire like SF-36 (assessed overall QoL) and they had found not much improvements in QoL of diabetes patients.[18,19] The limitation of these results is that these questionnaires were not disease specific. But present study used ADDQoL which is diabetes specific and not diabetes related complications. This could be one of reason for the positive findings of present study.

The reason behind improvement in overall QoL scores is motivation of the subjects in exercise groups, better glycemic control, less worries about diabetes, freedom to eat or drink, increase in self-confidence, social interaction with other participants and the variety of the physical training program. Also, subjects in the exercise group expressed their satisfaction about the amount of time available for physical exercise as compared with the control group.

In summary, the results of our study lead us to reject the null hypothesis and thus imply that 8 weeks of moderate levels of combined regimen of aerobic and resistance training is probably the best strategy for the improvements in glycemic levels and quality of life than either exercise achieved alone. However, improvements in QoL was equal in all exercises group.

Relevance to Clinical Practice:

We recommend Combined regimen of aerobic & resistance training as a life style intervention, one of the foremost medical care, to prevent diabetic bomb to explode in India in upcoming years. Diabetes experts would be quick to incorporate this "**inexpensive pill**" into practice guidelines for diabetes. The study results should stimulate all clinicians to include exercise counseling into

every clinical visit. As moderate level of activity does not require huge resources to be carried out, is an effective cost – saving tool in the care of type 2 diabetes. The present study strongly supports the need for, instituting physical activity programs as an essential part of diabetes care for type 2 diabetes.

Future Research:

As India got highest rankings for diabetes as one of the ignored area with limited number of researches, control trials with longer follow up and on larger population are needed for generalization of results. There is a need for more research examining the different combinations of intensity, duration and amount of physical activity. Studies are needed for better understanding of how acute and chronic activity exposures influence specific cellular mechanisms of glycemic control.

Conclusion

This study demonstrates that appropriately prescribed and supervised combined training i.e. aerobic and resistance training is feasible and more effective, in reducing blood glycemic values and exercises also results in improvement in quality of life in type 2 diabetes mellitus, in Indian population.

It is important to consider that the subjects' examined were middle aged (40.34 $\pm$ 3.55 yrs), overweight (27.53 $\pm$ 1.26 kgs), previously sedentary (< 60 min/week) & had diabetes since (2.67 + 1.01 yrs). The improvements in glycemic levels and quality of life in all exercise programs are thus functionally applicable in terms of recommending physical activity to sedentary overweight individuals that comprise a large segment of Indian population.

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Minimal Invasive Surgeries

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Small is in. Surgeon's latest craze nowadays is key hole or minimal invasive surgeries. Latest developments in technology focus on giving maximum features in minimal size. Trend is fast catching up with orthopaedics surgery as well. Gone are the days when "big surgeon, big incisions" used to rule the surgeon's training. I distinctly remember being cited by my professor for giving "homeopathic" incision for a surgery.

MIS, as the name suggests is done by least violation of tissue for a particular procedure. Best known example is arthroscopic surgery where evaluation as well as therapeutic intervention is achieved via key hole incisions and special instruments. This spares the soft tissue sleeve around the joint and the resultant morbidity. Rehabilitation is faster and easier. Patient can be discharged early. Incidence of infection is less as well as the hospital stay. Blood transfusions are not needed and need for medications is also decreased. There have been certain studies in the literature justifying MIS by noting definite reduction in parameters of tissue trauma.

But every coin has two sides. MIS is not everyone's cup of tea. Long learning curve, need for special equipments and instruments, increased cost of treatment and high complication rate in certain surgeries limit its wide application. Acceptance level for MIS amongst the patients as well as the surgeons is high but application needs lot of training and financial support which is the limiting factor. Let's see some surgeries where MIS principles have been adopted and results have been encouraging.

Trauma surgeries have definitely gone through the full circle. Starting out from close reduction and plaster immobilization or external splinting to close reduction and internal splinting with intramedullary nails for shaft fractures. Periarticular fractures are better stabilized with special locking plates. These modalities maintain the biological environment and are able to mobilize the patient as well as the joint earlier than the conventional treatment. These locking plates are a boon to osteoporotic bones where cement augmentation or the replacement was a preferable option earlier. Even the hard core proponents of open surgery have accepted the advantages of biological fixation with minimal invasive techniques.

Spinal surgeries have similarly decreased their morbidity to a great extent by resorting to MIS techniques such as endoscopic and microscopic procedures. Gone are the days when widespread laminectomy with thorough curettage of intervertebral discs used to ensure successful surgery followed by complete bed rest in supine position for weeks together. Wide spread fear of spine surgeries in general population has its roots in such practices.

Nowadays with MIS, patient can be made to stand on the same day and resume his ADL from day one. Video assisted thoracoscopic surgeries(VATS) have made anterior spinal release in scoliosis with anterior instrumentation a safe procedure. Even posterior instrumentation is possible nowadays with least dissection, making surgery a better option for trauma rather than prolonged bedrest followed by brace mobilization.

Arthroscopic surgeries have also undergone a sea change in comparison to only ablative surgeries before, along with diagnostic modality. I have seen surgeons diagnosing a meniscal tear by arthroscopy and then resorting to open menisectomy. Patients are being offered meniscal implantation and osteochondral grafting procedures. Ligament reconstruction is being done routinely arthroscopically and sports person are able to pursue their professional career till they want and not till the injuries, as was the situation earlier.

Arthroplasty surgeons are also getting bolder and influenced by new fad i.e. MIS. One would think that recreating a joint is best done by wide exposure especially the knee joint. Applying the principles, one need to expose the articular surface only and not the whole joint , to replace it. Special instruments and computer assisted surgeries have made the job easier and more accurate.

Changes are welcome, more so the ones maintaing the local biology. But as hammer is not the solution for all nails, one should not apply same principles everywhere. That'where wisdom needs to be applied and caution to be exercised.

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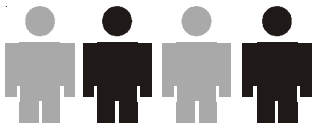

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Effect of Inspiratory Muscle Training in Early Rehabilitation of Guillain Barre Syndrome : Case Reports.

Case Report

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Abstract

Background & Objective: *Guillain Barre Syndrome is a neurological condition that requires early physiotherapy intervention. Respiratory complications are commonly associated with acute phase of GBS. Physiotherapists working in the Intensive care units are involved in the early rehabilitation which accentuates faster recovery. This paper projects the importance of least practiced Inspiratory muscle training in the management of respiratory muscle weakness in GBS.*

Key Words: *Guillain Barre Syndrome, Inspiratory muscle training*

Introduction

Guillain Barre Syndrome or GBS was first described way back in 1828 and has been defined as an inflammatory auto immune attack on the peripheral nerves which leads to segmental demyelination.[1,2] The entire spectrum of this disorder of unknown etiology would begin with hospitalization encompassing intensive critical care and then a phase of rehabilitation. The extent of demyelination varies from individual to individual.

Three phases of GBS have been identified; the initial phase begins with a period of paralysis and usually ensues for a period of 10-14 days. The plateau phase begins when the physical status is stable but there is no recovery. The recovery phase of this syndrome usually shows improvement of symptoms and return of function.[1]

The outcome from GBS is generally good with majority of the patients reporting complete recovery (60%-75%) and a few remaining disabled for a year or even ending with permanent disabilities (20%-25%). In any case rehabilitation of these patients is an important part of the treatment and this mainly depends on the symptoms that the patient presents with as well as the phase of the disease.[3]

The physical therapy measures in the acute care mainly aims at reducing the respiratory complications. Patients usually present with tachypnoea, retention of secretions and use of accessory muscles. The underlying respiratory muscle weakness is not given much importance though this leads to a cycle of pulmonary complications .The respiratory impairment usually varies from an obstructive to a restrictive pattern and pneumonia [4, 5, 6] In the recent past several researches have been conducted to find out the efficacy of Inspiratory muscle training including neurological conditions.

These Case reports explain the efficacy of early physiotherapy in the recovery following GBS.

Case No. 1

A 34yr old male, driver by profession, was admitted for progressive weakness of all four limbs since 4 days & difficulty in deep breathing at the time of admission. The weakness was initially in the hands & feet and slowly progressed to the proximal muscles. Patient also complained of weakness more over the left side of the body. There was no sensory disturbance.

Patient had history of fever a week back. There was no history of Hypertension, Diabetes mellitus and other chronic illness. Immediately after the admission he was shifted to medical ICU for continuous monitoring. He was connected with 4 L Oxygen through a face mask. He was referred for Physiotherapy.

On examination the therapist found the Patient was tachypneic, with signs of increased WOB, His vitals were noted as, Heart Rate = 88/min, Blood Pressure =110/70mm Hg, and Respiratory Rate = 28/min. On examination all the deep tendon reflexes were absent. Muscle strength assessment showed right upper limb & lower limb muscles were grade of 3/5, while left shoulder muscles were 2/5 except adductors which was 1+/5. Other right side limb muscles were grade 2/5. Abdomen muscle was of grade

3. Mouth Inspiratory pressure was -30cmH_2O. Cough was weak & functional.

Physiotherapy treatment was started for the patient 2nd Day after admission. Patient was treated thrice daily with deep breathing exercises, segmental expansion exercises, assisted coughing techniques, active assisted range of motion exercises and Inspiratory muscle training.

By the end of the first visit the patient was made to sit up with full bed support. Inspiratory muscle training was given by IMT with graded resistance initially started with a resistance of 7mm. Patient also started with I_gG infusion.

Physiotherapy sessions continued the same next day, patient's supports were same. Patient was complaining of increased weakness of the left side of the body, difficulty in sitting up with support.

For the next 3 days the same treatment continued with making the patient sit at the edge of the bed also. Patient was comfortable; no new muscle weakness was found and was on room air by 4th day morning. Active ROM exercises were performed daily for 3 sessions, assisted coughing along with progressive IMT.

From 6th day mild strengthening exercises were started with minimal resistance while patient is in high sitting position. Muscle power examination on 6th day showed right limb muscles of 3+/5, while left lower limb muscles improved by 3/5 which was 2/5 on admission. Inspiratory muscle strength examination using MIP showed mild improvement of -40cmH_2O, abdomen muscle strength was 3, & diaphragm grade 4. Patient was attended thrice daily like last 5 days & also encouraged for independent exercise sessions between the supervised exercise sessions.

By 7th day evening patient was made to stand with full support with 4 therapist assistance. Patient presented with reduced hip control while standing & mild buckling of the left knee. Patient was hemodynamically stable after standing got shifted to step down ICU. Other exercises were continued like previous sessions with strengthening exercises, IMT, assisted coughing. And by next day patient got shifted to ward and referred for Neurological rehabilitation.

Case No. 2

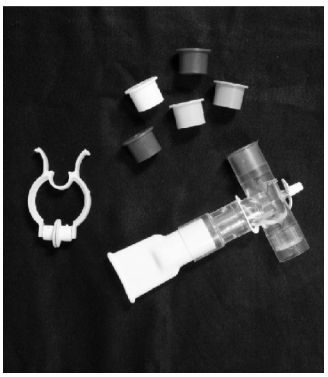
A 50yr old female house wife got admitted with history of sudden onset of weakness of all 4 limbs since 5days. Patient was having fever with severe joint pain 2 weeks back for which she got treatment in a local hospital. Patient also gave the history of cough with expectoration since past 2 weeks. She was suffering from since childhood and on regular medications. Initially patient was admitted in the ward. Next she presented with increased weakness of trunk muscles as well as difficulty in swallowing & breathing.

Immediately she was shifted to ICU, for continuous monitoring and for critical care. Initially in the ICU patient was on O_2 mask 5L. Physiotherapy treatment commenced from the day patient got shifted to ICU.

She was connected with 5 L Oxygen through face mask. She was tachypneic, with signs of increased WOB, her vitals were HR=98/min, BP=120/70mmhg, RR= 28/min. Auscultation showed bilateral crepitations with expiratory Rhonchi. On examination all the deep tendon reflexes were absent. Muscle power assessment showed right upper limb & lower limb muscles of grade 2/5. Abdomen muscle was of grade 3. Mouth Inspiratory pressure was -30cmH_2O. Cough was weak & functional.

Patient was treated 3rd hourly with breathing control exercise, segmental expansion exercises, assisted coughing techniques, active assisted range of motion exercises, Inspiratory muscle training. With each visit patient was made to sit up with bed support.

On 2nd day in the ICU, patient presented with severe respiratory distress, and the ABG showed severe respiratory acidosis. Patient was intubated (nasal) and connected to ventilator support with BIPAP mode FiO2 = 40%, Inspiratory pressure 27cmH_2O, P. support above peep = 15 cmH_2O, PEEP = 5 cmH_2O. Post intubation patient was hemodynamically stable. Physiotherapy treatment started with positioning, postural drainage, percussion, vibration, and suctioning & PROM exercises with supported sitting. Patient was treated by the therapist thrice a day.



Patient was on ventilator support for 2 days, on 2nd day patient was on CPAP mode with PEEP 4, FiO_2 = 35%, patient was conscious & was attended 3rd hourly since she was having retention of secretions. PDPV, followed by gentle suctioning was given. She was encouraged with Deep Breathing & active assisted exercises. By evening patient was weaned and was on ET tube with T piece oxygen 8L, IMT was stared with the ET tube.

Patient was extubated on the next day (6th day in ICU). Post extubation physiotherapy session started with positioning, PDPV, assisted coughing & oral suctioning, IMT, active exercises to the limbs, supported sitting. Patient was attended 3rd hrly.

On 8th day patient felt better no new muscle weakness noted on examination, DTR absent, muscle power analysis showed lower limb 3/5, upper limb 2+/5, cough effort weak functional, abdomen muscles 3/5, and diaphragm 4. Patient was made to sit on chair outside bed along with other regular treatment. Strengthening exercises started by the evening session with mild manual resistance. Same treatment continued for next 2 days.

On 11th day patient was made to stand with full support. Patient presented with reduced hip control while standing & also paraesthesia over the sole. Patient was made to stand with support in all the 3 sessions of treatment. Patient was hemodynamically stable.

On 12th day patient got shifted to step down ICU. Supported walking with walker was started inside the step down ICU. By evening patient got shifted to ward.

Discussion

These case reports explain the importance of early physiotherapy in the recovery following GBS especially the efficacy of Inspiratory muscle training. Lack of Inspiratory muscle strength in any of neuromuscular disease leads to decreased alveolar ventilation and may produce micro atelectasis and further will lead to altered Ventilation Perfusion (V/Q). Weakness of the Inspiratory muscle will alter the compliance of the thorax which in turn further increases the work of breathing [9].

Strengthening the respiratory muscles has proven to increase the isometric pressure generated by the Inspiratory muscles (PiMax) [10]. On the basis of these physiological principles, both the patients were given IMT by using non threshold resistor. Patient Perception was considered in determining the intensity. IMT was given to increase the strength. In the first case, the IMT was considered as a prophylactic measure to prevent mechanical Ventilation. Since the patient was well motivated, it was feasible to administer IMT. In the second case it was not possible to start IMT immediately after initial physiotherapy evaluation since she developed respiratory failure due to her comorbidity. The maximal Inspiratory pressure was measured by using a simple manometer. A significant improvement in PiMax was noted in the post training measurements in spite of a variation training periods. This increment may be attributed to the training effect. These case reports explain the importance of IMT in the early rehabilitation of GBS.

Conclusion

IMT may hence be considered as an integral part of the early stages of neuro-rehabilitation.

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Research Article

Barriers to Exercise for Individuals with Spinal Cord Injury: An Indian Perspective

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Abstract

Background & Objective: *Physical activity participation among people with spinal cord injury and other disabling conditions is substantially lower than in the general population. Several reports have noted that a sedentary lifestyle can precipitate functional decline in persons with spinal cord injury that limits his or her ability to work, recreate and engage in community events. Benefits of exercise in improving outcomes after Spinal cord injury are increasingly recognized. However, despite the salutary effects of exercise on the overall health of those with Spinal cord injury, there are physical and psychological barriers preventing them from participating in a fitness program and reaping its benefits. Identification of barriers to exercise among individuals with spinal cord injury is the first step to reducing such barriers to facilitate participation in exercise and improve health outcomes. The purpose of this study was to describe barriers to exercise among individuals with Spinal Cord injury. In addition, identify differences in exercise barriers between those with paraplegia vs. tetraplegia.*

Methods: *A total of 50 subjects who fulfilled the inclusion criteria and were ready to participate in the study were selected. Nine subjects did not complete the survey and hence were excluded from the study. Group 1, n=20, consisted of Tetraplegics; Group 2, n=21, consisted of Paraplegics. Outcome Measures included, Barriers to physical exercise and Disability Survey (revised) and Concern Index*

Results: *The two major barriers reported were the Lack of transportation (63.4%) and the Cost (58.5%) associated with joining a fitness facility.*

Conclusions*: The degree of participation in exercise among people with Spinal cord Injury is affected by a multifactorial set of barriers that are unique for this population. Long-term sustained exercise by people with Spinal Cord Injury might be promoted by efforts to develop intervention strategies that have a greater likelihood of success.*

Key Words: *Spinal Cord Injury, Barriers to Exercise, Physical Activity*

Introduction

Spinal cord injury as we all know is a catastrophic event that immeasurably alters activity and health. In India, around 15 lacs people live with SCI with approximately 20,000 new cases added every year.

Considering the growing population and increased life expectancy of people with SCI, efforts should be targeted towards improving health and quality of life in this segment of the population. An important aspect would be to emphasize on higher levels of exercise and physical activity. Exercise might be used as a tool to enhance health by slowing the multisystem medical complications unique to those with SCI.

Voluminous amount of research has shown the benefits of exercise in patients with Spinal Cord Injury. Exercise has shown to improve:

- Functional capacity
- Bone density

- Endurance
- Muscle strength
- Psychological well being
- Quality of life (Q.O.L .)
- Decrease Pain

Despite, the evidence of benefits of exercise, people with disabilities are far less likely to engage in physically active lifestyles than people without disabilities. Several barriers to exercise may impede participation, thereby increasing health risks associated with inactivity and a sedentary lifestyle.

Barriers to exercise and physical activity may be critically important, and are accorded more attention when people with disabilities are considered. Barriers may be:

- Environmental (physical and social aspects)
- Personal

The level of everyday exercise and physical activity in persons with SCI improves during inpatient rehabilitation period. However, post-discharge, there is a strong decline in the level of everyday exercise and physical activity. Therefore, stimulation of a physically active lifestyle after discharge is warranted in persons with SCI.

However, to optimize exercise and physical activity in community dwelling persons with SCI, it is important to determine the barriers to exercise after their discharge.

Purpose

- To identify barriers to exercise for community dwelling individuals with Spinal Cord Injury in India.
- In addition, identify differences in barriers to exercise between those with tetraplegia vs. paraplegia.

Methodology

Sample

- A total of 50 subjects who fulfilled the inclusion criteria and were ready to participate in the study were selected. Nine subjects did not complete the survey and hence were excluded from the study.
- Group 1, n=20, consisted of Tetraplegics
- Group 2, n=21, consisted of Paraplegics

Inclusion Criteria

- Diagnosis of Spinal Cord Injury
- Age between 18-80 years
- Community dwelling, more than 1 year post-injury.

Exclusion Criteria

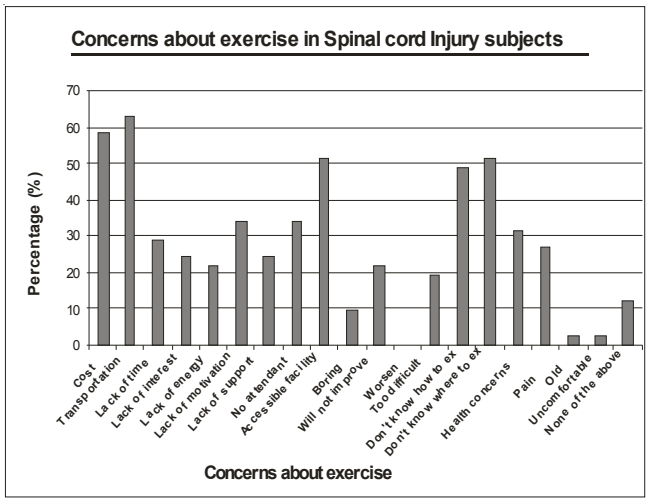
- Any medical conditions that would interfere with participation in the study.
- Cognitive dysfunction that would limit ability to complete surveys
- A primary disability unrelated to Spinal Cord Injury

Procedure

A sample of 41 subjects (Group 1, n=20, tetraplegics; Group 2, n=21, Paraplegics) who met the inclusion criteria took part in the study. A detailed explanation of the procedure was given after which the subjects signed an informed consent. Demographic data was collected and the survey was conducted using Barriers to Physical Exercise and Disability survey either personally or via a telephonic interview.

Outcome Measures

- Barriers to Physical Exercise and Disability survey (revised) developed by Rimmer et al, 2003
  - Test- retest reliability= 0.76
  - Inter-rater reliability= 0.86
- Concern Index
  - Internal consistency= 0.70



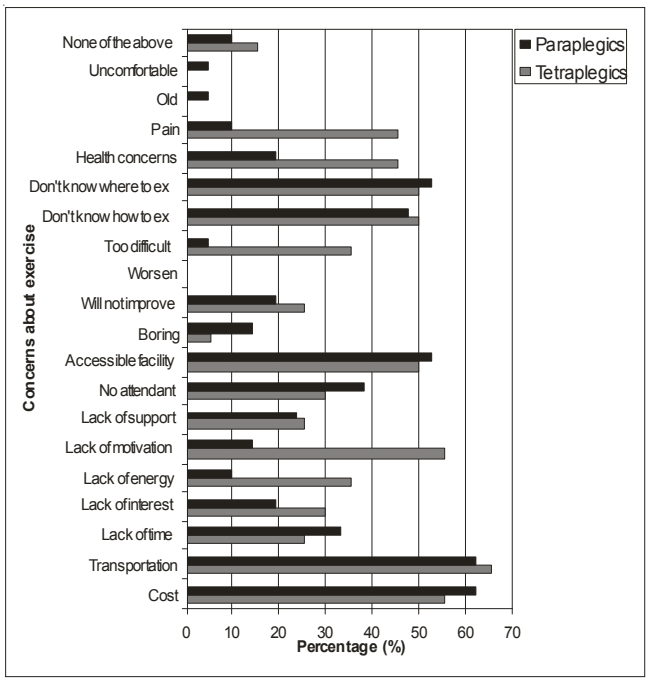
Data Analysis

- Statistics were performed using SPSS software.
- Chi-square analysis was used to ascertain significant differences between groups (i.e. Tetraplegia vs. Paraplegia)
- Level of significance was set at $p \leq 0.05$.

Results

- While majority (78.1%) of the subjects thought an exercise program would help them, less than half (40.2%) were currently involved in an exercise program.
- None of them had been injured while exercising while quite a few subjects cited health problems such as Pain, Urinary tract infection (UTI) and pressure sores as a cause for discontinuing exercises.
- About 46.3% subjects reported that they did not have a positive experience of going to a fitness centre and cited the main reason as lack of accessibility.
- Approximately half of the sample reported being told by their doctor to exercise.
- 51.2% subjects said they did not know of a fitness centre that they could get to. Transportation and the cost associated with going to an exercise centre posed as the major barriers.

Concerns about Exercise



Concern Index

The concern index included the total number of "yes" responses to the 20 concerns about physical exercise.

- Mean Score : 5.7 $\pm$ 2.87
- Using independent t-test, we found that there was no significant difference between tetraplegics (n=20) and paraplegics (n=21)in terms of concern index (t=1.56, p=0.13)

Relationship between Injury level and Barriers to exercise:

- Chi- square analysis was used to compare subjects with tetraplegia and paraplegia regarding concerns about exercise.

Concerns about exercise in Tetraplegics and Paraplegics

- Significant differences between both groups were seen in regard to:
  - Lack of motivation (55% vs 14.3%, respectively; Chi-square=7.55, p=.006)
  - Exercise being too difficult (35% vs. 4.8%, respectively; Chi-square=4.19, p=0.041)
  - Pain (45% vs. 9.5%, respectively; Chi-square=6.56, p=0.010)

Discussion

Major Barriers

- Lack of transportation (63.4%)
- Cost (58.5%)

These findings were consistent with previous research conducted by Rimmer et al[2] in the year 2000 that involved predominantly African- American women with physical disabilities (60.5% & 84% respectively). Similar barriers were also found to be associated with exercise for individuals with stroke (57% & 61% respectively)[3].

Scelza et al, 2005[4] however reported that patients with Spinal cord injury in their study did not indicate transportation as a barrier. A probable reason for this maybe that the patients were living in a more affluent region with many community resources. The top concerns about exercise were lack of motivation, lack of energy, cost, not knowing where to exercise, and lack of interest. Lack of accessible fitness facility was one of the top barriers in both the groups. Cardinal et al[5], 2004 identified that even if the fitness facilities were accessible, only 8% provided adequate accessibility to and around the actual exercise equipment.

As suggested by Kinne et al[6], 1999, it was found that motivation barriers were more powerful predictors of exercise maintenance among tetraplegics as compared to paraplegics. Significantly more individuals with tetraplegia indicated that exercise was too difficult and that pain and health concerns prevented them from exercising.

Conclusion

- The degree of participation in exercise among people with Spinal cord Injury is affected by a multifactorial set of barriers that are unique for this population.
- Long-term sustained exercise by people with Spinal Cord Injury might be promoted by efforts to develop intervention strategies that have a greater likelihood of success.

Limitations

- Small Sample size
- Exercise self efficacy was not considered
- Education level was not considered.

Future Research

- Research to quantify the magnitude of change in exercise level among persons with spinal cord injury after certain barriers that they face are removed.
- A similar study within a longitudinal framework may be conducted, since many barriers are likely to change across time and settings.

Suggestions for Improvement

Strategies that will reduce the negative effect of these barriers on the health of individuals with Spinal cord injury should be encouraged in order to reduce the barriers to optimize health and well being. Some of the strategies are:

- Home- Based exercise program
- Care giver training
- Role Model development
- Counselling

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Case Report

Total Knee Replacement in Severe Varus Deformity

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Majority of the patients who needs Total Knee Replacmenet have osteoarthrosis and almost 90% of these patient's have varus deformity of variable extent. In our country, unlike western/developed nations, patients come rather late for operation and often by that time they already have severe varus deformity.

The patho-anatomy of the varus deformity includes contracture of the medial collateral ligament, posteromedial capsule, pes anserinus and some times even semi membranosus muscles on the medial side. The lateral collateral ligament is lax and elongated and there may be varying degree of bone loss on the meidal side of the tibial plateau. Rarely there may be associated problems like stress fractures of tibia.

Preoperative planning would include physical exam to see the degree of deformity, range of motion and ligament laxity etc. Full length standing AP, Lat and tangential view radiographs are taken to look for mechanical axis, bone defects and any stress fractures.

Important points in surgery of severe varus knees are:

- Progressive/sequential release of tight medial/ postero-medial structures and excision and removal of osteophytes to achieve soft tissue balance.
- A conservative proximal tibial reaction.
- Management of bony defects and any stress fractures.

The bony defects on the medial tibial plateau may be central but mostly peripheral. Small defects which are less than 5 mm. deep and involve less than 25% of tibial surface can be filled with bone cement. For the larger defects we use metallic wedges or bone grafts which could be structural bone grafts or impaction bone grafting. Bone grafts are preferable because of availability, cost and the fact that they rebuild the bone stock in the defect area. Recently some bone substitutes have also become available but there use is not very popular in joint replacement as yet.

For structural bone graft we use the technique as described by Windsor et al in "clinical orthopaedics & related research" in 1986 and popularized by Sculco in the book "Master techniques" in 1985. For larger defects I prefer tibial mesh and morsalized impaction bone grafting.

Finally selection of prosthesis is also very critical. In severe varus deformity we use PCL sacrificing posteriorly stabilized design. If we have grafted a large bony defect or if there is a stress fracture I always use long tibial stems. In case where there is gross lateral ligament instability one must go for constrained condylar type of prosthesis.

Considering all these factors, to perform a good Total Knee Replacement Surgery in a patient with severe varus deformity and bone defects is always a surgical challenge even for the very experienced arthroplasty surgeons.

A clinical example:

Pre-operative condition

Post-operative condition

DIABETES MELLITUS : "EACH ONE MUST TEACH ONE"

Thursday , 12th February, 2009

One day Conference organized by BCIP at Auditorium, Chandiwala Estate, Kalkaji

It is a fact that the prevalence of Diabetes Mellitus is a definitive result of urbanization and socioeconomic development. Besides appropriate support of healthcare system, there is a strong need to initiate an all out movement for spreading awareness about this emerging alarm in our society. Also, in this era of fast changing methods and approaches in medical sciences, it is necessary for today's healthcare professionals to update with recent advancements in such areas. In an attempt to equip our students and colleagues with the best and latest in patient care, BCIP organized a one day conference on: **DIABETES MELLITUS:EACH ONE MUST TEACH ONE.**

Dr. A.K. Jain, Professor, Physiology, MAMC presented a brief note on relevant Physiology of Diabetes Mellitus. It helped to recapitulate the basic concepts and enhanced understanding of the condition.

Dr. Geeta Tekchand, HOD, Physiotherapy, Artemis Hospital highlighted the Physiotherapeutic Considerations in Diabetes Mellitus. It widened the horizons of Physiotherapy management in its treatment.

Dr. Sachin Jain, Professor, Dept. of Endocrinology, LHMC delivered a lecture on Drug Therapy, Monitoring & Prevention of Diabetes Mellitus. The content of the lecture was quite latest and informative.

Dr. Ashu Bhasin, PhD Scholar, Dept of Neurology, AIIMS emphasized on Physiotherapy Management of Complications associated with Diabetes Mellitus. Her speech mainly emphasized about increasing role of Physiotherpeutic exercises in the condition.

Dr. Ish Anand, Sr Consultant, Neurology, Sir Ganga Ram Hospital briefed about the Neurological Complications in Diabetes Mellitus. He made the audience aware of the early signs and symptoms associated with these complications.

Dr. Hemant Juneja (PT) HOD, Amar Jyoti Institute of Physiotherapy summarized on the challenges and solutions of Diabetic sportspersons, their coaches and the health care team.

ORGANIZING COMMITTEE

Organising Secretary : **Dr. Chaya Garg** Treasurer: **Dr. Angusamy R.**

Coordinators: **Dr. Abha Khurana, Dr. Sumit Kalra**

HIP REPLACEMENT SURGERY : "A JOINT EFFORT"

Wednesday, 15th April 2009

One day Workshop organized by BCIP at Auditorium, Chandiwala Estate, Kalkaji

Effective management of hip arthropathy is undergoing revolutionary changes both intellectually and technologically, these days. Recently hip replacement surgeries have emerged as new treatment options in a variety of challenges. Surgery of such an advanced dimension necessitates thorough knowledge and clinical competence, knowledge about its technique is also required for paramedical and supportive staff for its better outcome and final rehabilitation. To facilitate this BCIP organized a one day workshop on: **HIP REPLACEMENT SURGERY : "A JOINT EFFORT"**

Dr. Asha Singh, Director Prof (Retd), Anatomy, MAMC delivered the inaugural lecture on Anatomy & Biomechanics of Hip Joint. This laid the foundation for understanding of the subsequent lectures.

Dr. Dhananjay Gupta, Sr Orthopedic Surgeon, Orthonova Hospital elaborated on various types of implants, techniques and complications. It helped to update the knowledge of audience about the recent advances in the surgeries.

Dr. Poonam Narang, Prof, Radiology, G.B.Pant Hospital & MAMC dealt in great detail with Radio diagnosis in hip arthropathies. This will surely enhance the clinical decision making skills of the delegates.

Dr Shalini Grover, Sr Lecturer, FIT briefed the audience about the principles of conservative management in hip arthropathies. Her lecture made the audience aware about the conservative treatment options available in these patients.

Dr. S. K. Sharma, Sr. Orthopedic Surgeon, Dept of Orthopedic Surgery, DDU Hospital emphasized on the history, general and biomechanical considerations, indications and contra indications for hip joint replacement surgeries.

Dr Nishant Gemini, Head, Dept of Physiotherapy, Primus Super Specialty Hospital made the audience aware about Pre and post operative physiotherapy in hip arthropathies. The rehabilitation protocols provided by him were very practical and informative.

ORGANIZING COMMITTEE

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