

THE EFFECTS OF TABLE TENNIS TRAINING ON CARDIAC AUTONOMIC DYSFUCTION IN PERSONS WITH SPINAL CORD INJURY



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INTRODUCTION

CARDIAC AUTONOMIC NERVOUS SYSTEM (ANS) DYSFUNCTION IS A FREQUENT COMPLICATION IN PEOPLE WITH SPINAL CORD INJURY(SCI). DUE TO ALTERED SYMPATHETIC-PARASYMPATHETIC BALANCE CARDIOVASCULAR COMPLICATIONS, AS DYSRHYTHMIAS AND CARDIAC ARREST, ARE OFTEN. THE EFFECTS OF EXERCISE TRAINING ON ANS DYSREGULATION IN SCI REMAIN UNCLEAR.

PURPOSE

THE AIM OF THE STUDY WAS TO EXAMINE THE EFFECTS OF A LONG-TERM TABLE TENNIS PROGRAM ON CARDIAC ANS IN QUATRIPELGICS.

METHODS

PARTICIPANTS:

14 SCI (C6-C7) PATIENTS WITHOUT OTHER DISEASE WERE RANDOMLY DIVIDED INTO TWO GROUPS:

GROUP A (7 MALES, AGED 39,3±5,2 YEARS), THAT PARTICIPATED IN A 6-MONTH PROGRAM WITH TABLE TENNIS.

GROUP B (7 MALES, AGED 39,4±3,9 YEARS),SERVED AS CONTROLS.

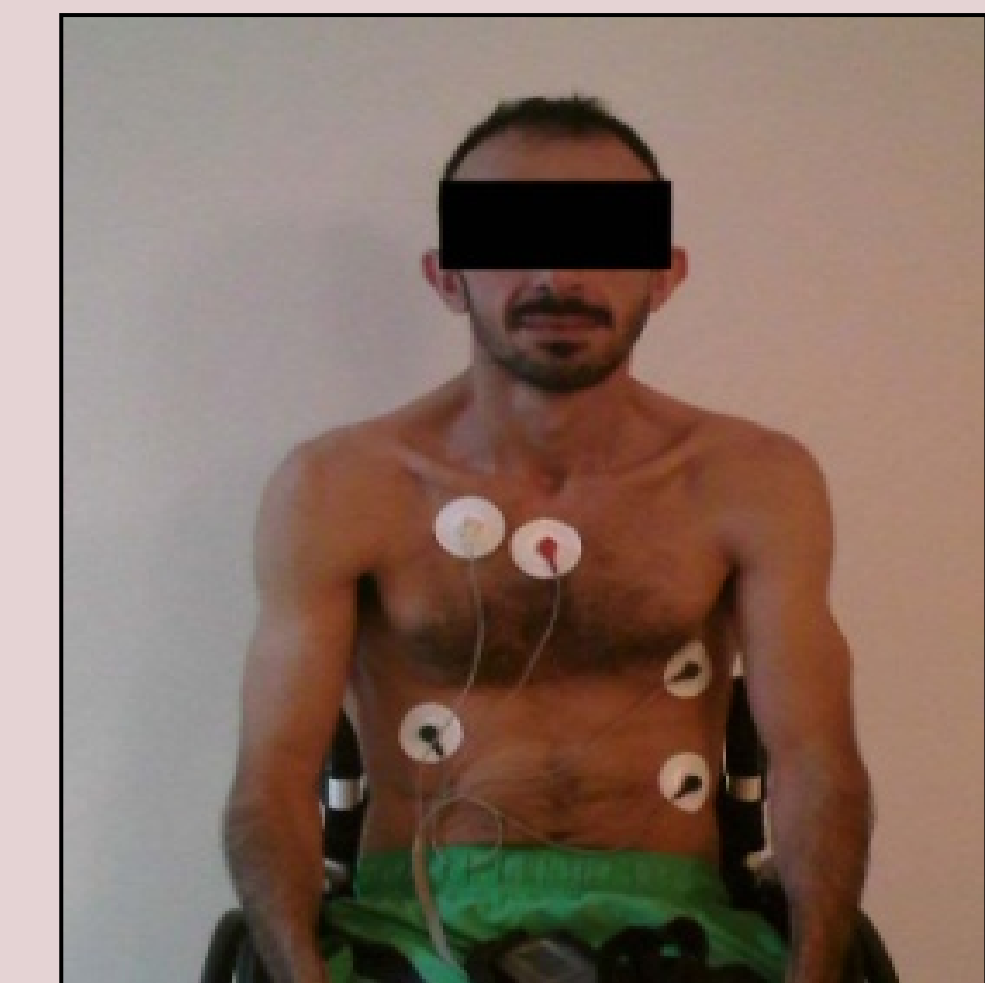
GROUP C (7 MALES, AGED 40,0±6,1 YEARS) HEALTHY SEDENTARY WERE USED AS HEALTHY CONTROLS.

AT BASELINE AND THE END OF THE STUDY THE FOLLOWING WERE EVALUATED:

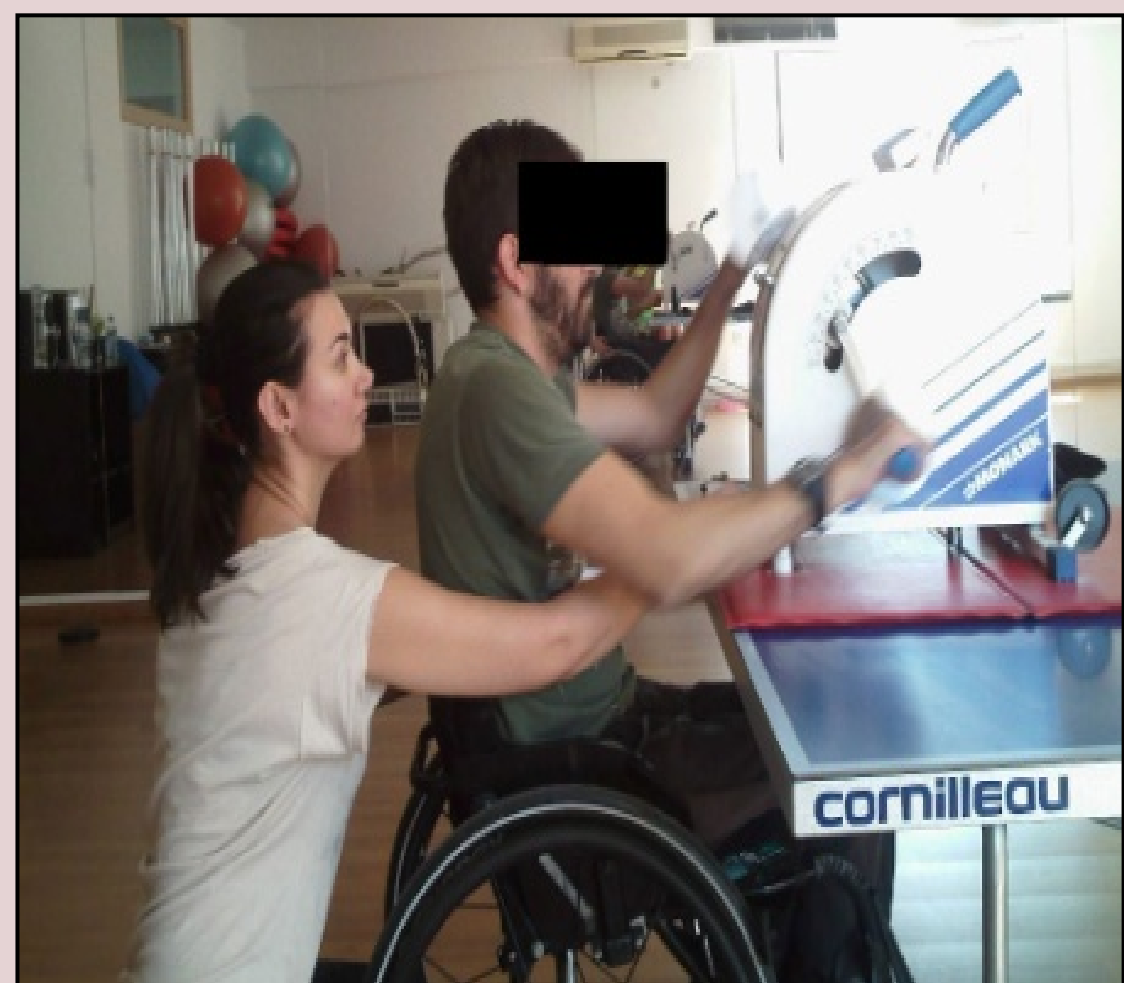
- HRV ON TIME- AND FREQUENCY DOMAIN ANALYSIS BY A 24-HOUR AMBULATORY ECG MONITORING,
- UPPER LIMB EXERCISE TOLERANCE AND MUSCLE STRENGTH

6-MONTH PROGRAM WITH TABLE TENNIS

- WARM UP 10MIN
- TABLE TENNIS 50-70% OF HRmax
- 70 MIN INTERVAL EXERCISE
- RELAXATION 10 MIN -STRETCHING



24-HOUR AMBULATORY ECG MONITORING HOLTER



MAXIMAL EXERCISE ON ARM CRANKING
(Exercise Protocol 5watt/2 min)



GRIP STRENGTH TEST
USING ISOMETRIC
HANDGRIP DYNAMOMETER



HRV
DURING TABLE TENNIS
EXERCISE



ALSO
IN GROUP A,
HRV WAS CONTINUOUSLY MONITORED DURING TABLE TENNIS BY A HR MONITOR TO EVALUATE THE ACUTE ANS RESPONSE TO EXERCISE.

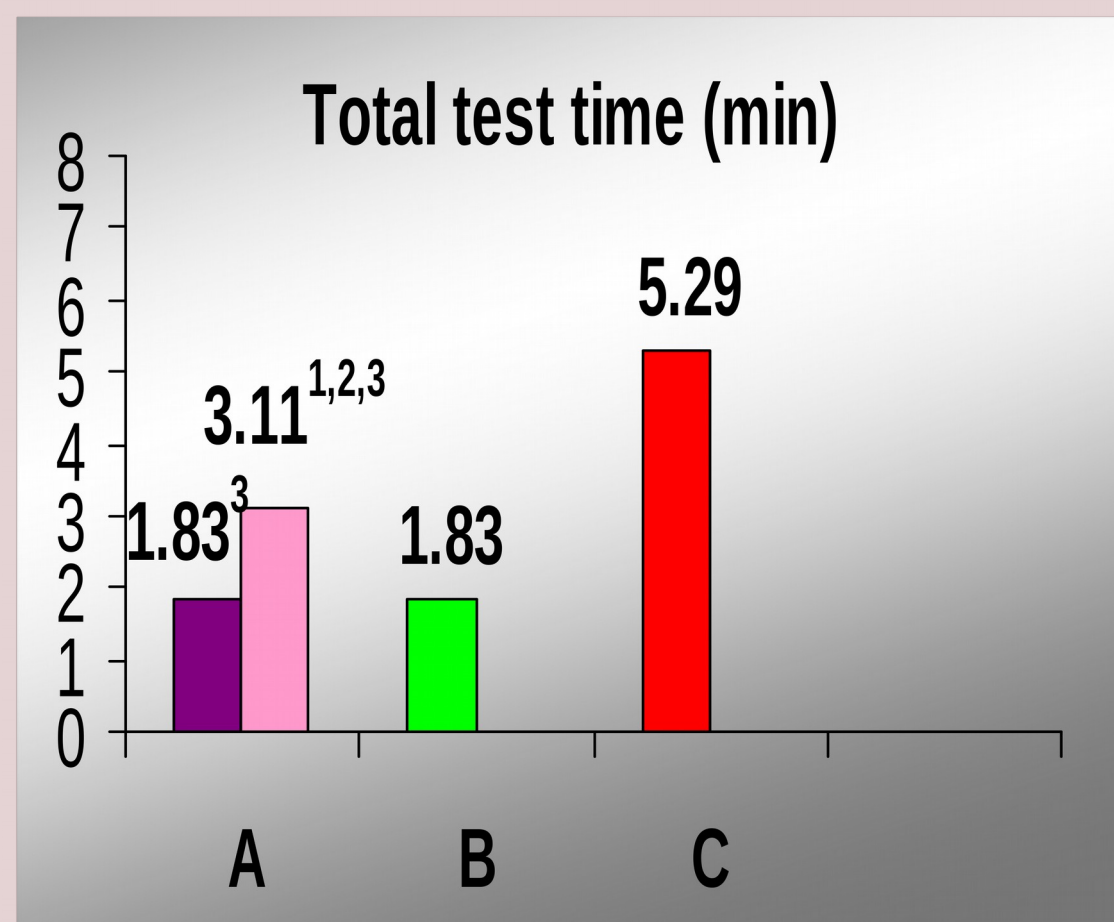


RESULTS

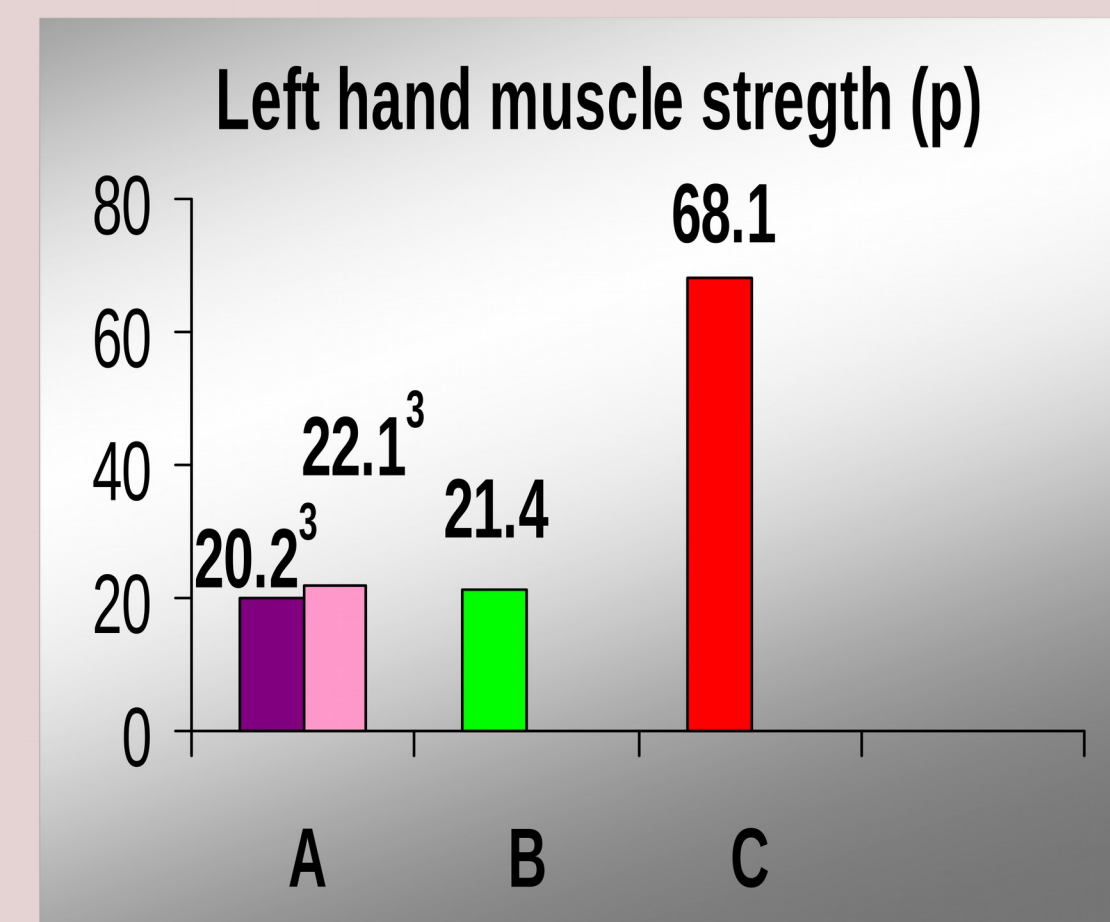
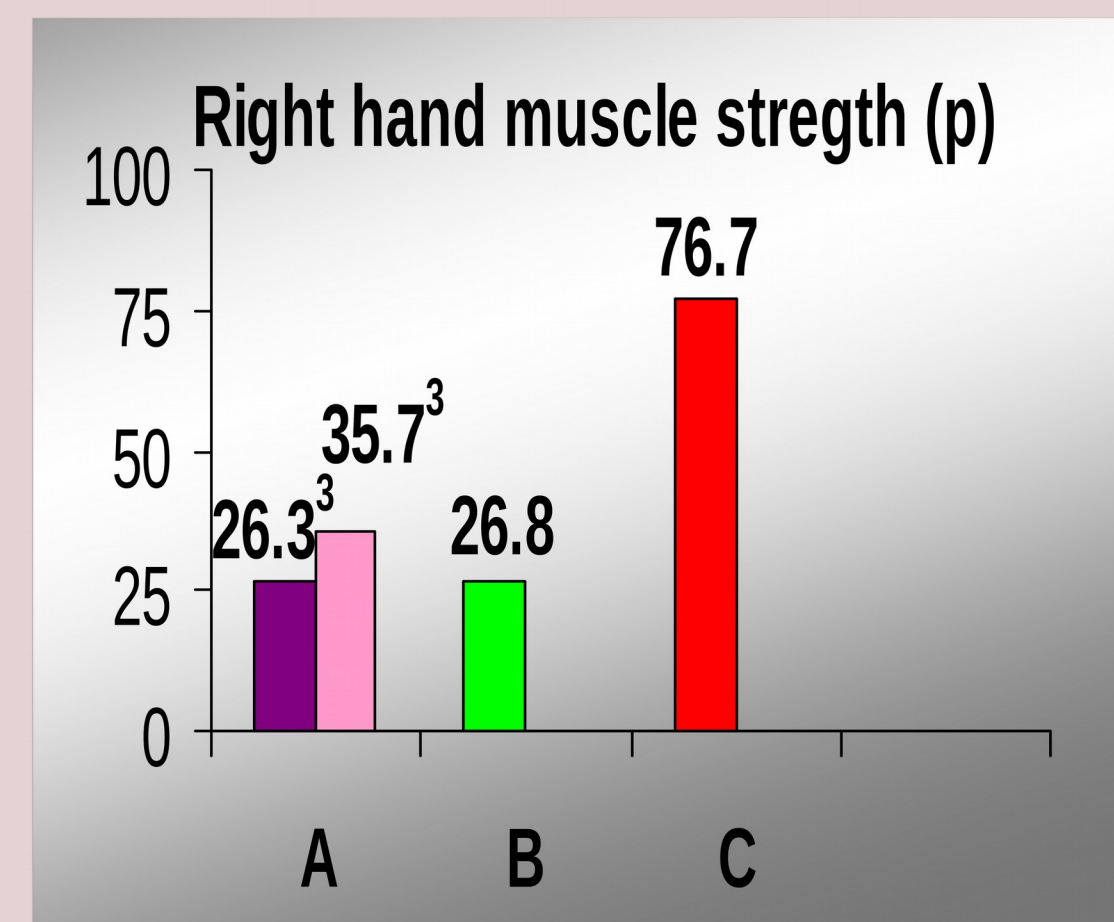
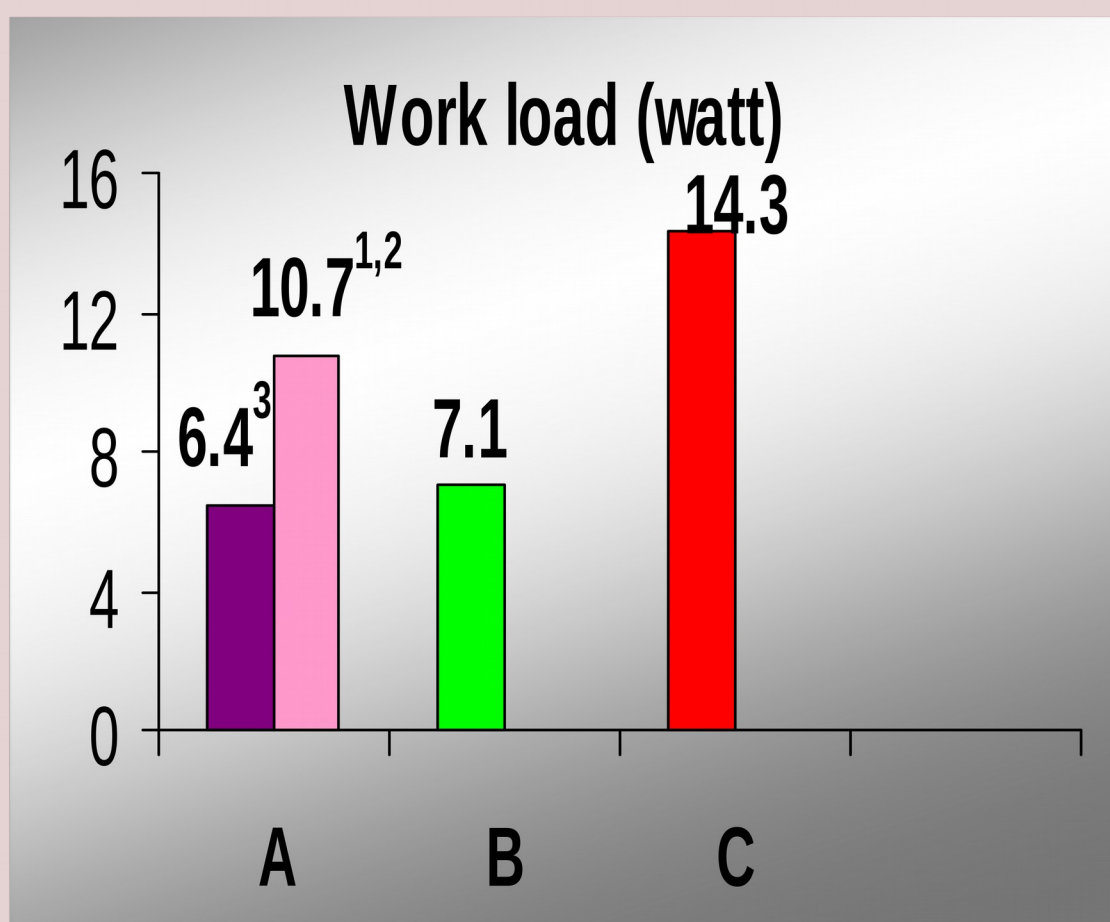
DEMOGRAPHIC CHARACTERISTICS OF THE STUDY POPULATION

| | GROUP A (n=7) Mean (SD) | GROUP B (n=7) Mean (SD) | GROUP C (n=7) Mean (SD) |
|-------------------|----------------------------|----------------------------|----------------------------|
| Age (years) | 39.3 (5.2) | 39.4 (3.9) | 40.0 (6.1) |
| Height (cm) | 176.1 (5.7) | 178.9 (5.5) | 179.9 (8.5) |
| Weight (Kg) | 79.0 (8.7) | 80.9 (3.5) | 84.1 (10.4) |
| Level of Injury | C6-C7 | C6-C7 | - |
| Time Since Injury | 12.6 (2.1) | 12.9 (3.6) | - |

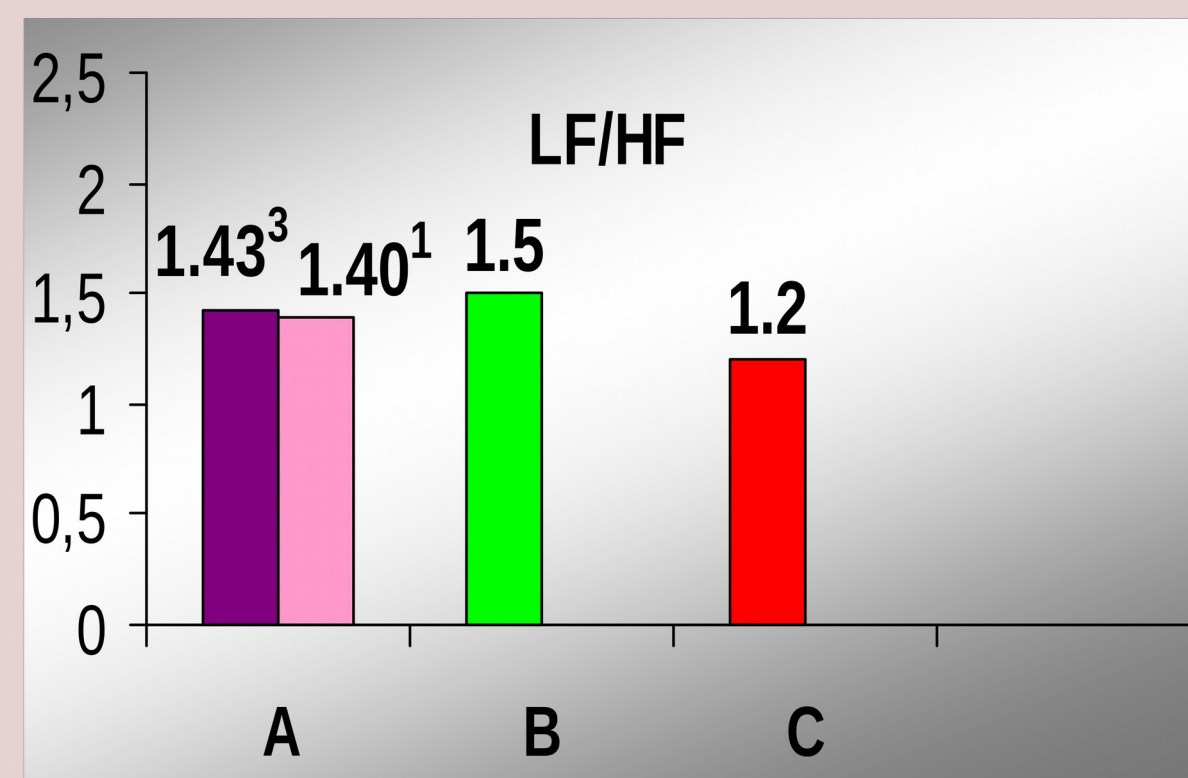
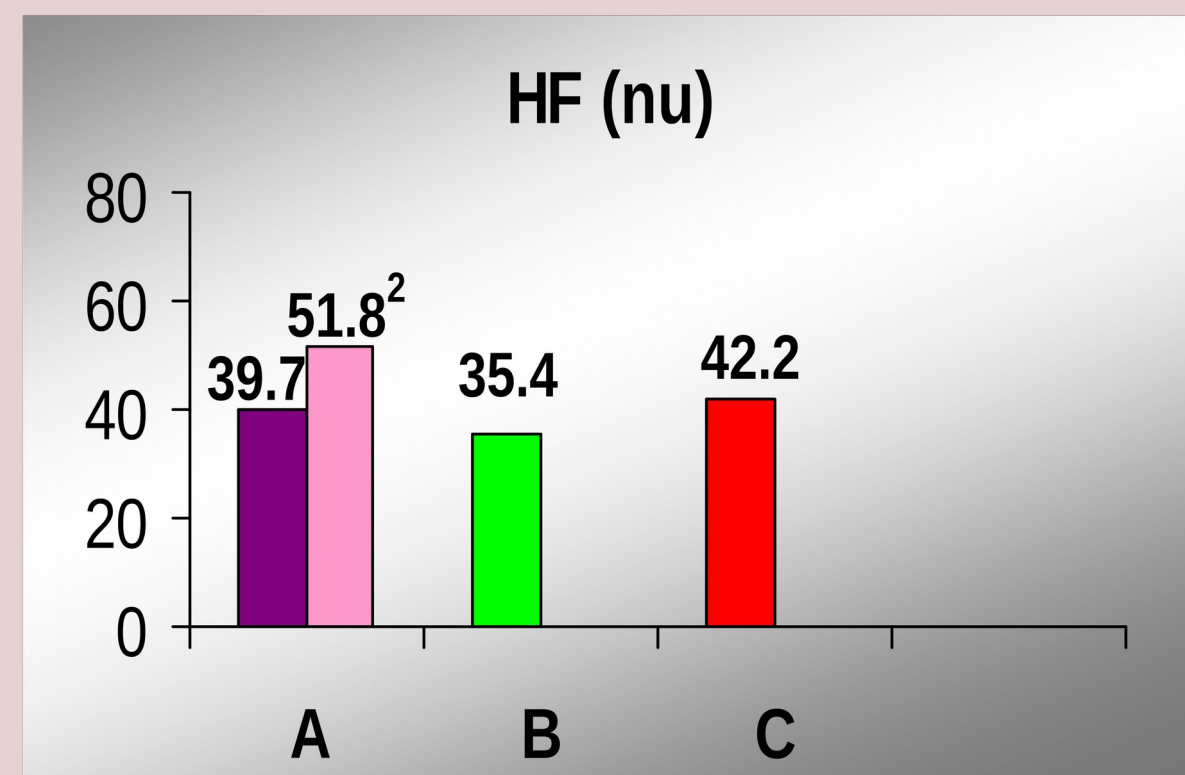
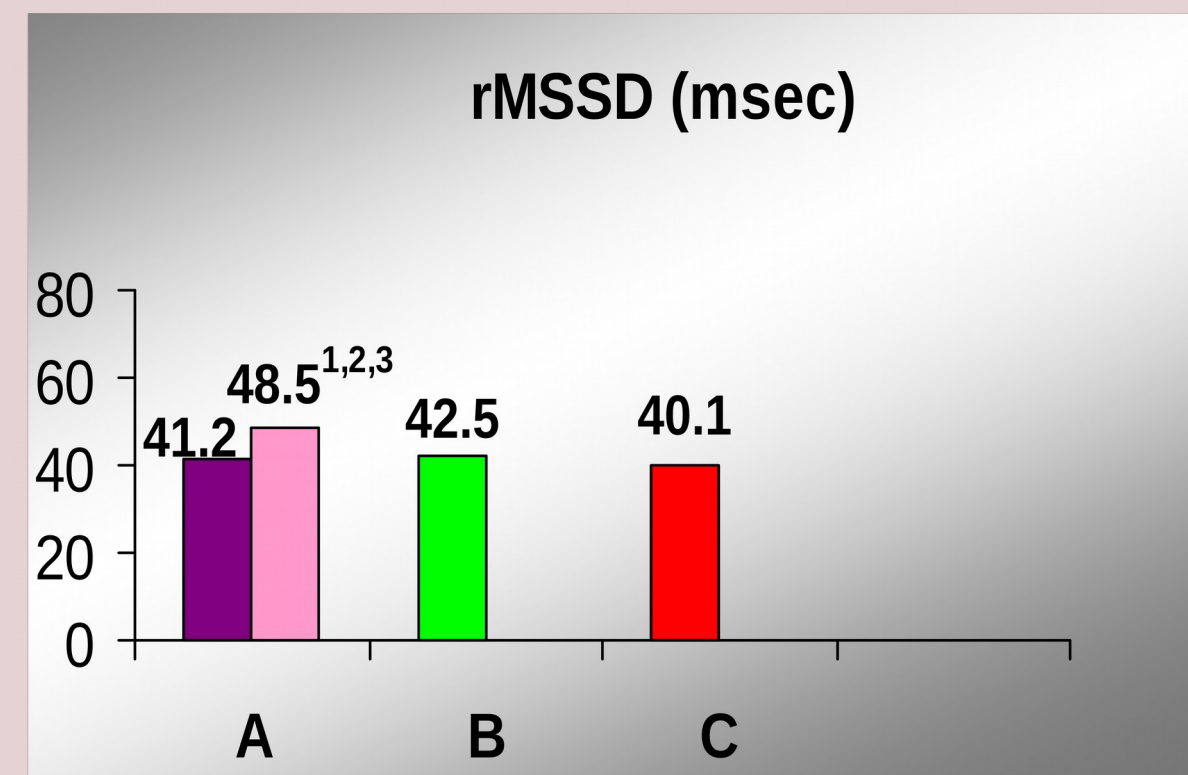
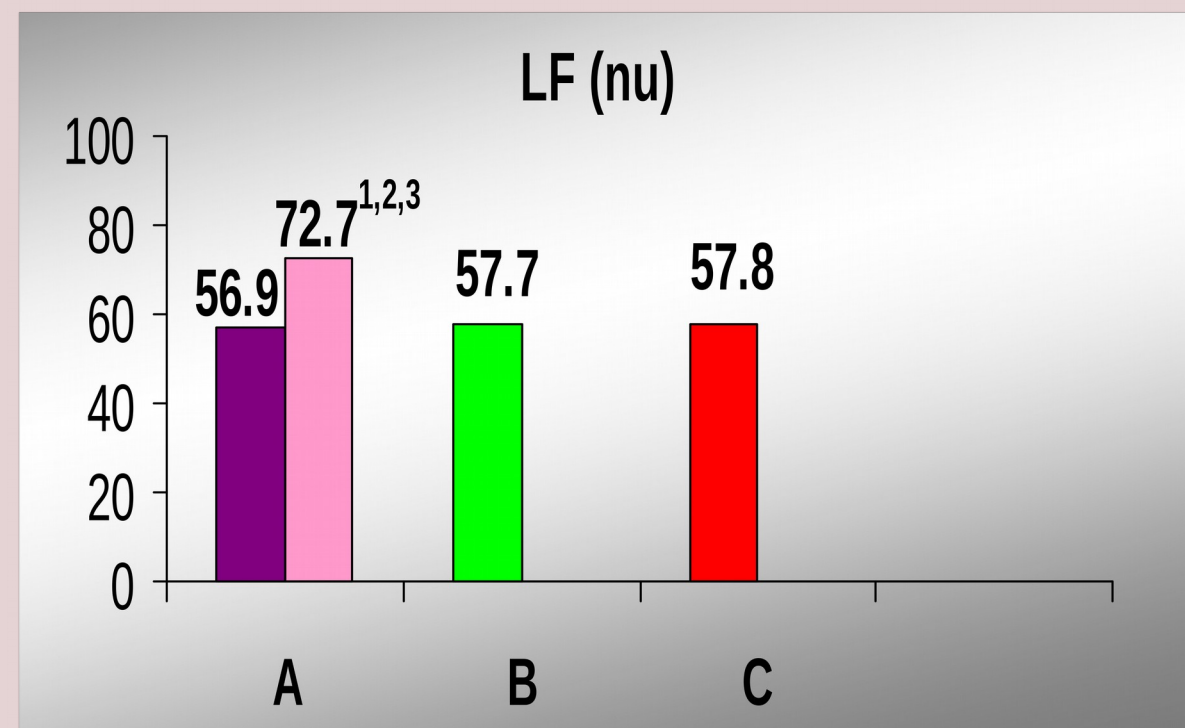
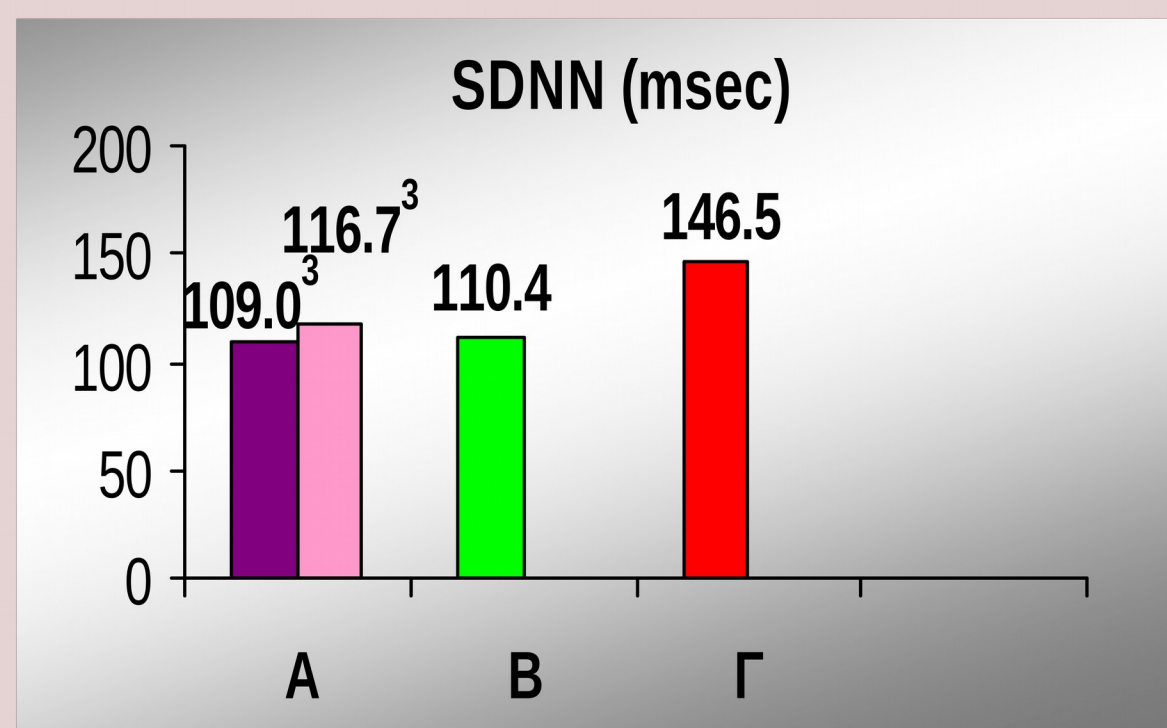
UPPER LIMB EXERCISE TOLERANCE



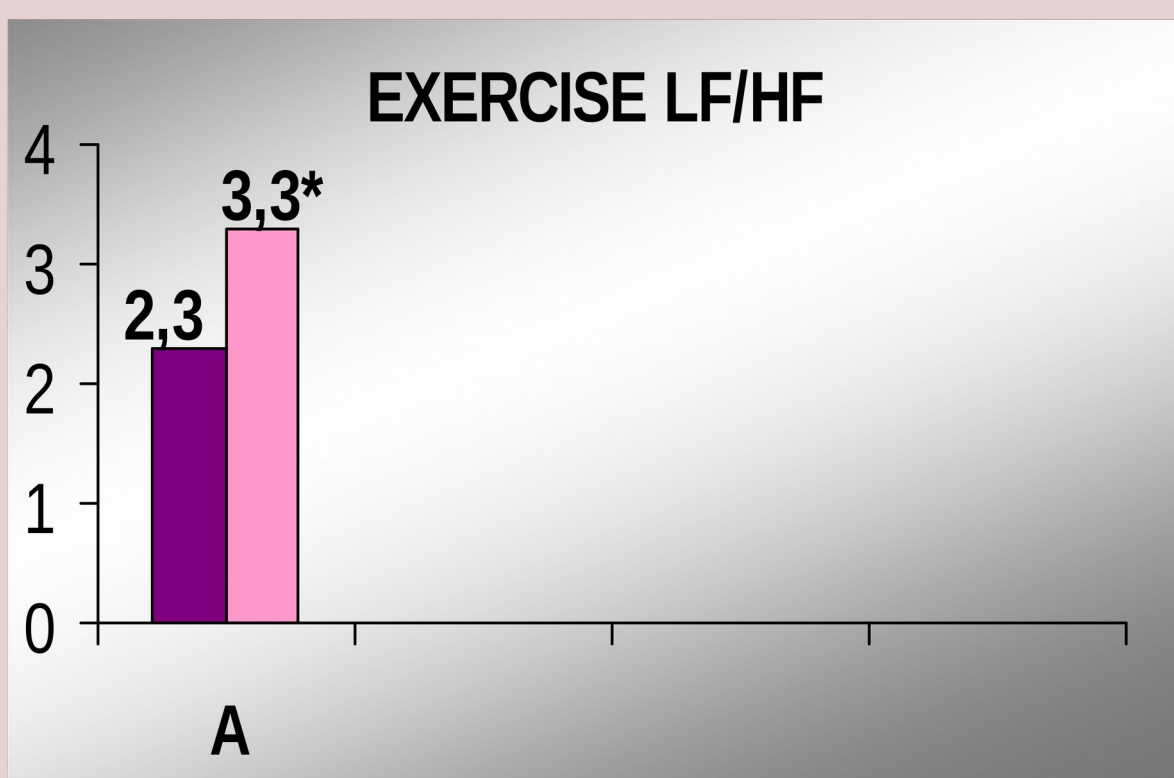
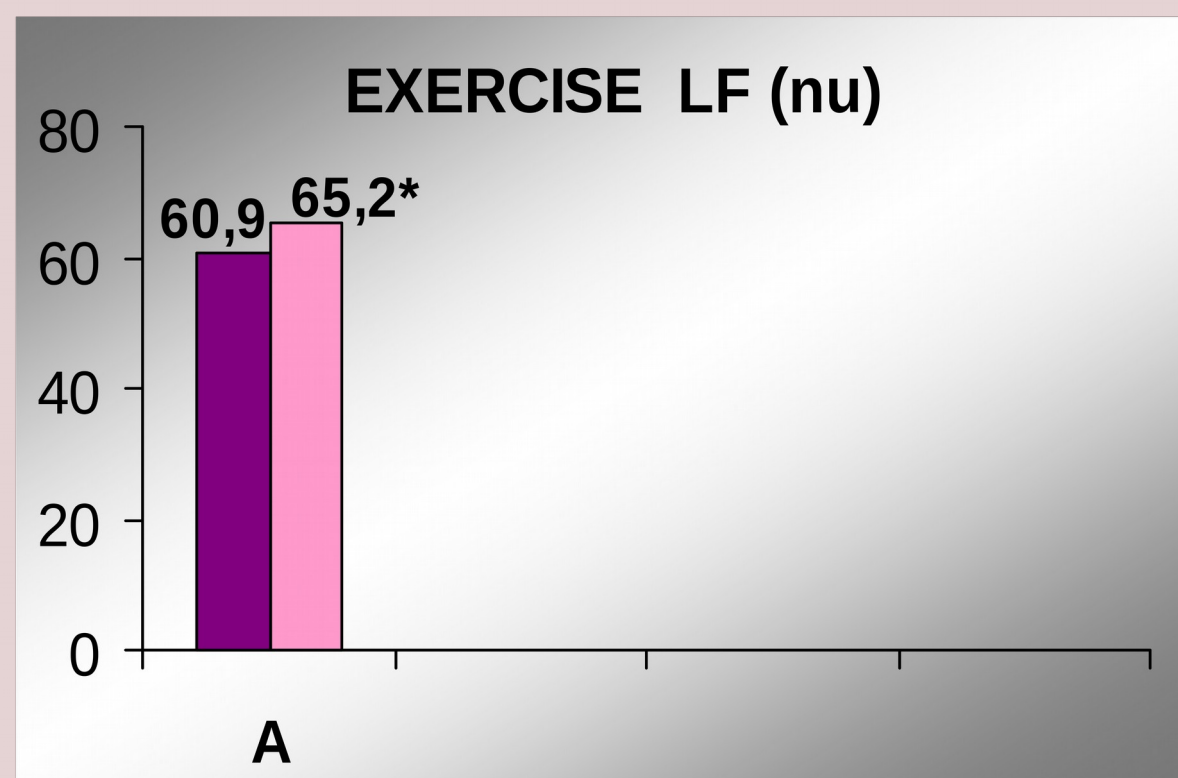
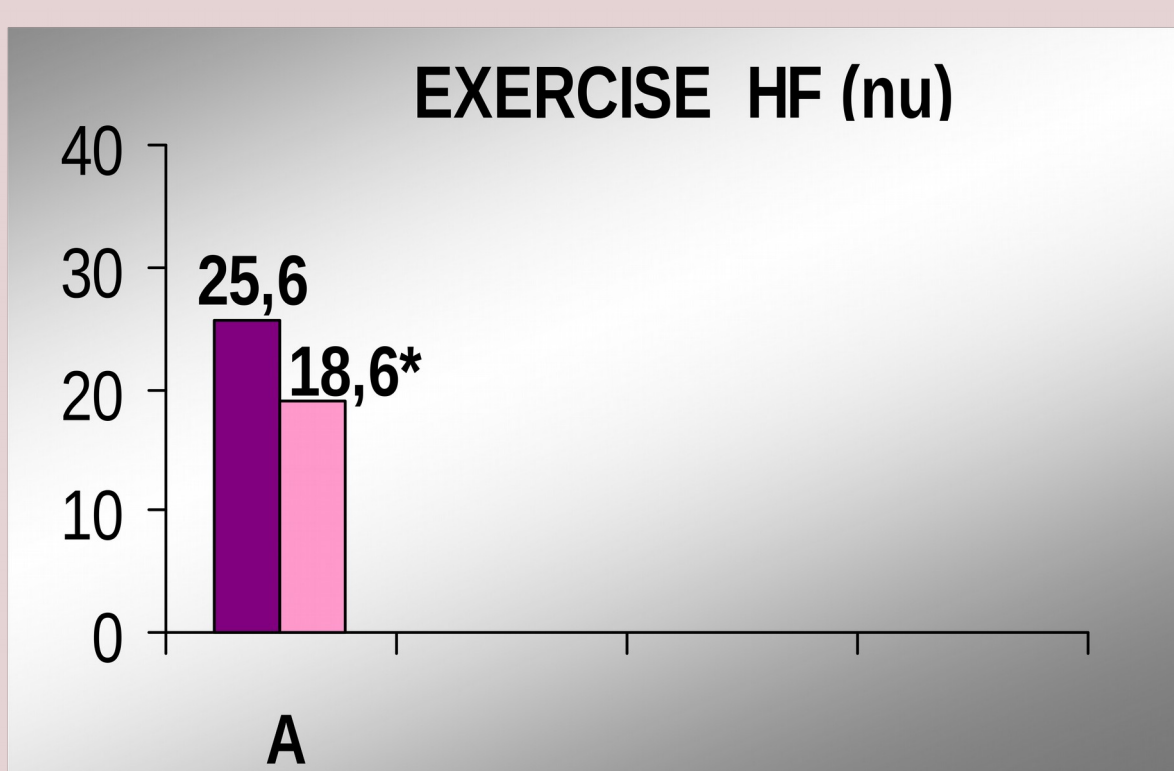
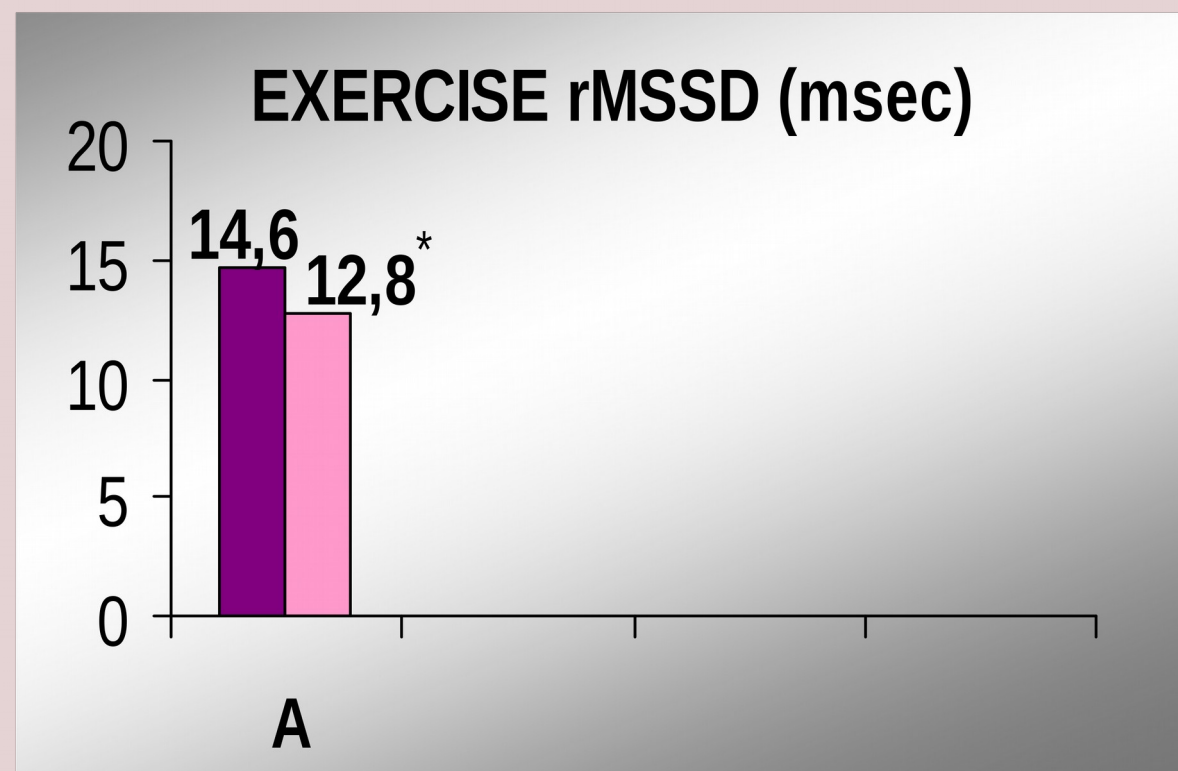
UPPER LIMB MAXIMUM GRIP MUSCLE STRENGTH



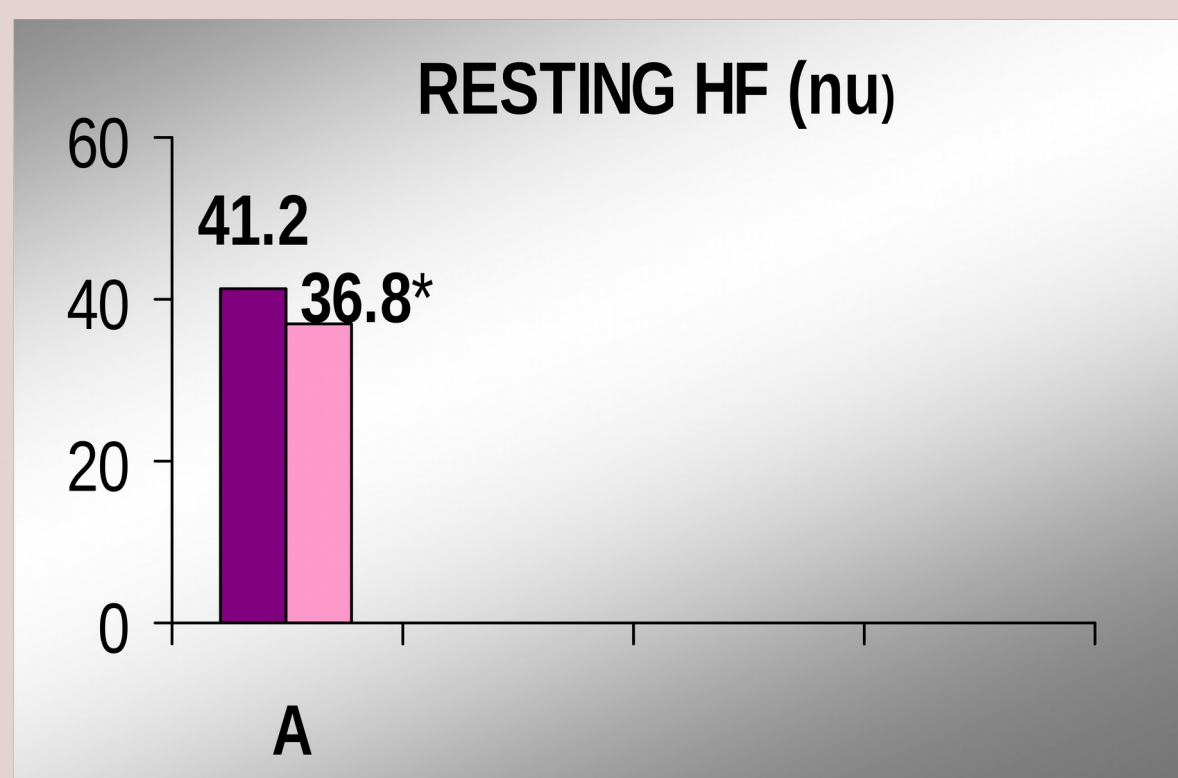
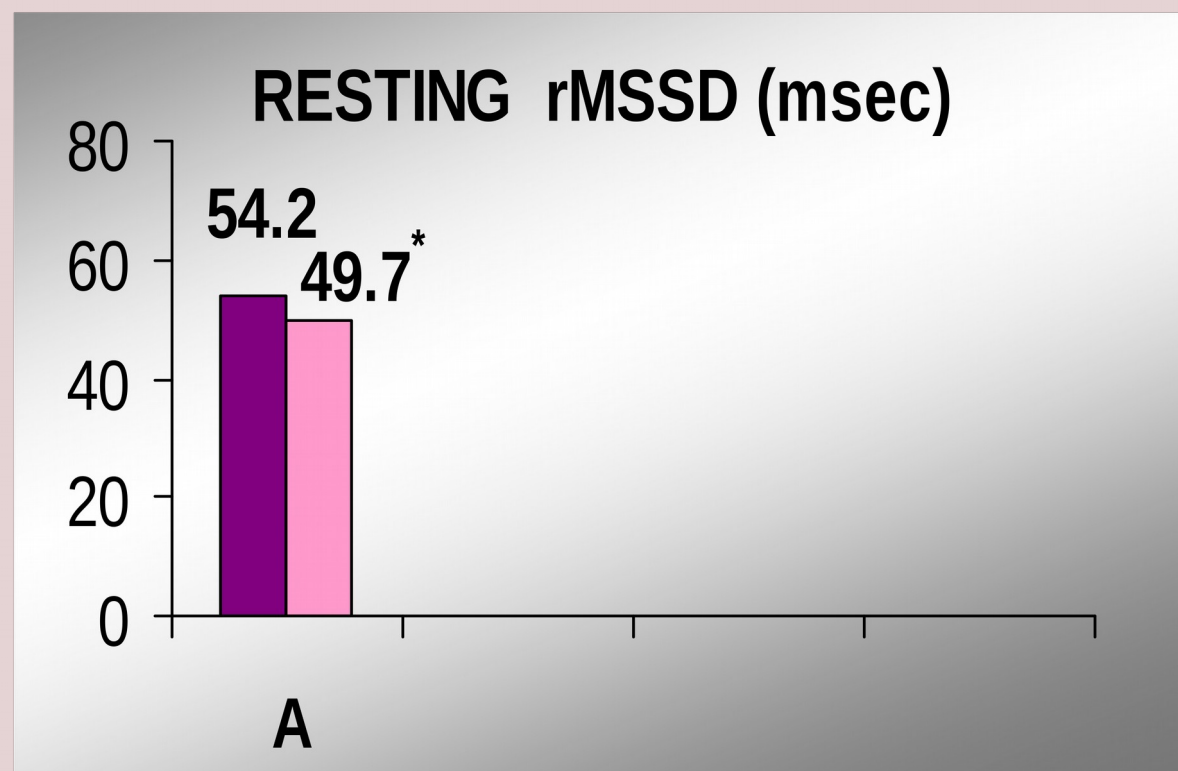
24 HOUR HRV ON TIME AND FREQUENCY DOMAIN ANALYSIS



HRV DURING TABLE TENNIS EXERCISE



RESTING HRV



AT BASELINE, THERE WERE NO SIGNIFICANT DIFFERENCES IN LONG-TERM HRV INDICES BETWEEN THE TWO PATIENTS GROUPS. ON THE OTHER HAND, SDNN WAS LOWER IN GROUP A COMPARED TO C (109,0±9,4 VS 146.5±8.8 ms, P<0.05),WHILE THE DIFFERENCES IN THE rMSSD, LF, HF AND LF/HF WERENT SIGNIFICANT. AT THE END OF THE STUDY, GROUP A SHOWED AN INCREASE IN SDNN (116.7±6.5 VS 109.4±9.4 ms, NS), rMSSD (48.5±4,8 VS 41.2±6.2ms, P<0.05), LF (72.7±12.4 VS 56.9±8.4 nu, P<0.05), HF (51.8±12.4 VS 39.7±12,8 nu, NS) AND A DECREASE IN LF/HF (1.43±0.6 VS 1.40±0.4, NS) COMPARED TO THE PRE-TRAINING VALUES. AFTER TRAINING, RESTING UPRIGHT POSTURE SHORT ANS MEASUREMENTS SHOWED THAT THE rMSSD AND HF WERE DECREASED BY 8.3% AND 10.7% (P<0.05),WHILE LF AND LF/HF DID NOT CHANGE SIGNIFICANTLY;AS RESPONSE TO ACUTE EXERCISE ,THE REDUCTION OF rMSSD AND HF AND THE INCREASE OF LF AND LF/HF WERE SIGNIFICANTLY HIGHER AFTER TRAINING. MOREOVER, TABLE TENNIS TRAINING SIGNIFICANTLY IMPROVED UPPER LIMBSMAXIMAL EXERCISE TOLERANCE BY 69.9% AND MUSCLE STRENGTH BY 35.7%.

CONCLUSION

A 6-MONTH TABLE TENNIS TRAINING PROGRAM IN QUADRIPELGICS HAS THE POTENTIAL TO PROMOTE A BETTER BALANCE BETWEEN SYMPATHETIC AND VAGAL ACTIVITY, MAINLY DURING UPRIGHT POSTURE AT REST AND EXERCISE