

Research article

Estimating the effectiveness of the multi-/interdisciplinary therapeutic program in elderly patients with incomplete myeloradicular injuries after cervical spinal cord injury

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ABSTRACT: Nowadays elderly persons may be frequent victims of traumatic cervical spinal cord injury (CSCI). A selected group of 28 (7 women (25%) and 21 (75%) men) elderly tetraplegic patients with traumatic CSCI, were admitted to the THEBA Neuromuscular Rehabilitation Clinic with incomplete (AIS-B, -C, -D) myeloradicular injuries. The female patients had an average age of 71.42 years, 5 of them coming from rural areas and 2 from urban areas. The male patients had an average age of 69.11 years, 10 of them living in rural areas, and 11 in urban areas. The spine lesion location was at the C2 vertebral level (in 3 women and 4 men), C3 (in a woman and 4 men), C4 (in a woman and 6 men), C5 (in 1 woman and 5 men); C6 (in a woman); C7 (for 2 men). The patients' neurological levels of injuries were: C2 (in 3 women and 4 men), C3 (in one woman and 4 men), C4 (in one woman and 6 men), C5 (in one woman and 5 men), C6 (in one woman) and C7 (in 2 men). The AIS / Frankel degree at admission, was: complete lesion (AIS-A), in 1 women patient, incomplete lesion AIS-B (in 2 male patients), AIS-C (for 2 women and 10 men), AIS-D (for 4 women and 9 men). The average muscle strength at admission was 62.71 (SD 23.32) for women patients and 59.44 (SD 26.89) for male patients; and at discharge these averages were 70.5 (SD 21.23) for women and 69.22 (SD 27.06) for men. In the study group there were 19 operated patients (3 women and 16 men); in which the anterior osteosynthesis was performed (for 3 women patients and 10 male patients) and respectively the posterior vertebral approach (in 6 male patients). The neurological evolution was favorable, so that at discharge were only patients with incomplete lesions AIS-C (1 women and 11 men), AIS-D (6 women and 10 men). The following comorbidities were associated: obesity (in 2 men), arterial hypertension (in 7 women and 11 men), diabetes (in 2 women and 4 men), traumatic brain injury (in 7 men), chronic alcoholism (in 2 men), pneumonia (in one woman and 6 men), neoplastic diseases (in 2 men), osteoporosis (in one woman and one man), anemia (in one woman and one man), glaucoma (in one woman), depression (in one woman), Lyme disease (in one woman), ischemic heart disease (in 3 women and 1 man), gastric ulcer in one man and ankylosing spondylitis (in 2 men). Complications of the immobilization syndrome were enterocolitis (in 2 men), bronchopneumonia (in 6 male patients), urinary tract infections (in 6 women patients and in 12 male patients) and bedsores (in one male patient). Effectiveness of the final therapeutic approach was assessed (in percentage) by evaluating the progress of the muscle strength (quantified and compared at discharge vs. admission) reported to the number of days of treatment. Statistics was performed for small groups (Anova and Pearson) to establish the effectiveness of the rehabilitation program, evaluating the level of correlation between the scores quantified with the aforementioned the scales. An inversely proportional relationship was found between spasticity and kinetic therapy efficacy (F 0.000, Pearson -0.09), between the PENN scale scores and kinetic therapy efficacy (F 0.000, Pearson -0.24) and a directly proportional relationship between the scores assessing quality of life, FIM and the efficacy of kinetic therapy (F 0.02, Person 0.42). These results underline the importance of a multi-interdisciplinary team approach in the management of the tetraplegic patients after CSCI during the subacute post-lesional/ post-operative stage.

1. INTRODUCTION

Spinal cord injury (1,8,9) is a medical condition that has dramatic consequences in the personal and social life of the patient through motor and sensory deficits (somatic and vegetative) that it produces (2,10,12). Most spinal cord injuries have a traumatic cause (3,4,5). In the modern world, spinal cord injuries occur in all age groups (11,13,14). Among them, elderly patients represent a population category at risk of both spinal cord injury and life-threatening complications (6). Of all the methods of recovery from spinal cord injury (including in elderly patients), physical therapy exercises bring the most benefits in the short, medium and long term (7,8,9,15-19).

Material and methods

A retrospective study (January 2019-March 2021) we conducted with the approval of the Ethics Commission of THEBA, to assess the results of the complex medical rehabilitation program during the subacute period. The statistical processing of the information (and scale analysis of: Functional Independence Scale, FIM; QualityOf Life, QOL; Modified Ashworth Scale, MAS; PENN spasm frequency scale; MRC muscle strength scale) was done using Office Windows 2013. Effectiveness of the final therapeutic approach was assessed by evaluating (in percentage) the progress of the muscle strength (quantified and compared at discharge vs. admission) reported to the number of days of treatment. Statistics was performed for small groups (Anova and Pearson) to establish the effectiveness of the rehabilitation program, evaluating the level of correlation between the scores quantified with the aforementioned scales.

A selected group of 28 elderly tetraplegic patients [7 women (25%) and 21 (75%) men] with traumatic SCI, were admitted to the THEBA Neuromuscular Rehabilitation Clinic with incomplete myeloradicular injuries.

The female patients had an average age of 71.42 years, 5 of them coming from rural areas and 2 from urban areas. The male patients had an average age of 69.11 years, 10 of them living in rural areas, and 11 in urban areas.

The patient neurological levels of injuries were: C2 (3 women and 4 men), C3 (1 woman and 4 men), C4 (1 woman and 6 men), C5 (1 woman and 5 men), C6 (1 woman) and C7 (2 men).

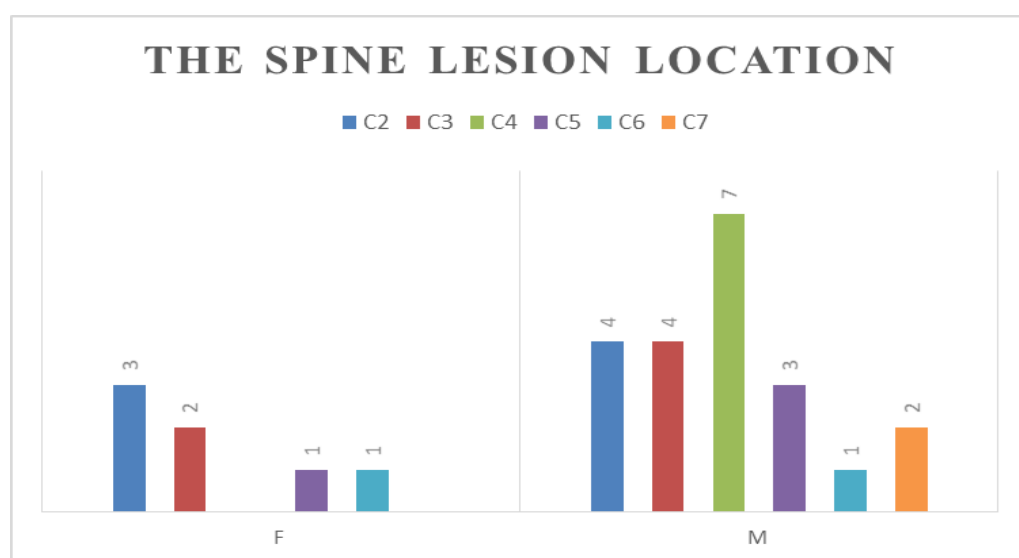
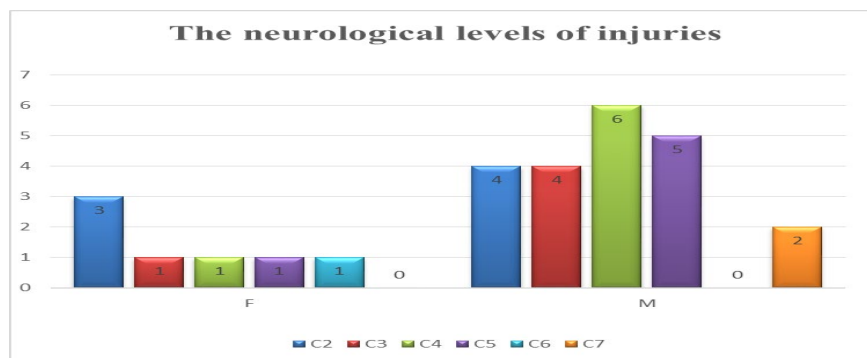


Fig no1. The spine lesion location

The spine lesion location was at the C2 vertebral level (3 women and 4 men), C3 (1



woman and 4 men), C4 (1 woman and 6 men), C5 (1 woman and 5 men); C6 (a woman); C7 (2 men).

Fig no2. The neurological levels of injuries

In the study group there were 19 operated patients (3 women and 16 men); in which the anterior osteosynthesis was performed (for 3 women patients and 10 male patients) and respectively posterior vertebral approach (in 6 male patients).

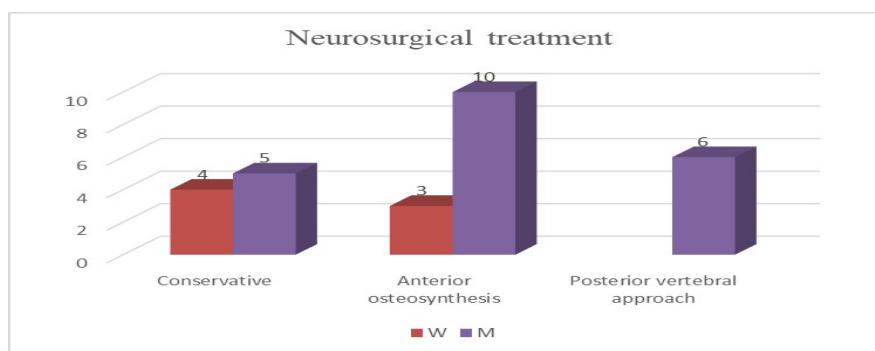


Fig no3. Patients treatment

The following comorbidities were associated: obesity (2 men), arterial hypertension (7 women and 11 men), diabetes (2 women and 4 men), traumatic brain injury (7 men), chronic alcoholism (2 men), pneumonia (1 woman and 6 men), neoplastic diseases (2 men), osteoporosis (1 woman and 1 man), anemia (1 woman and 1 man), glaucoma (1 woman), depression (1 woman), Lyme disease (1 woman), ischemic heart disease (3 women and 1 man), gastric ulcer in one man and ankylosing spondylitis (2 men).

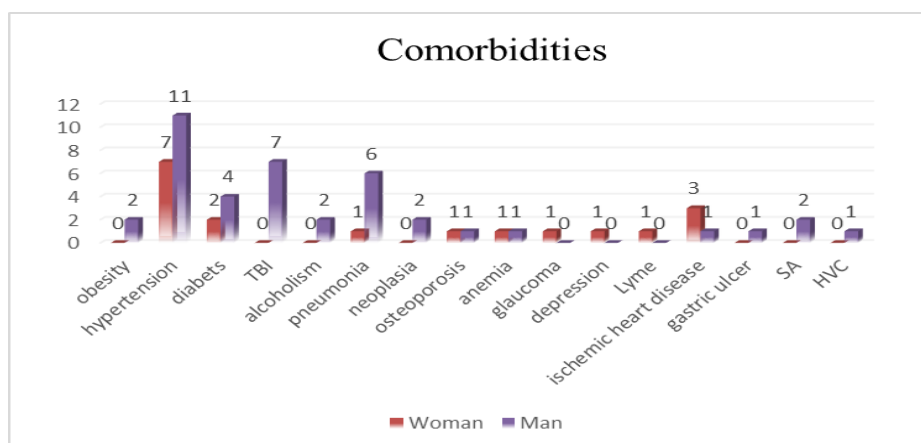


Fig no4. Patients comorbidities

The neurological evolution of patients was favorable, with a positive evolution of the muscle strength scores at discharge compared to admission.

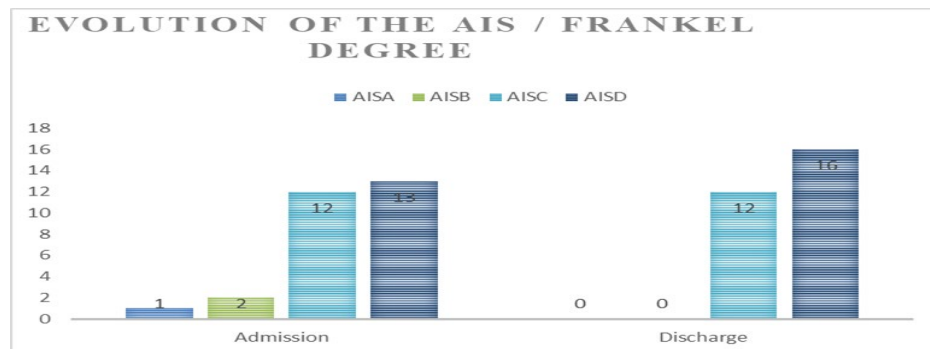
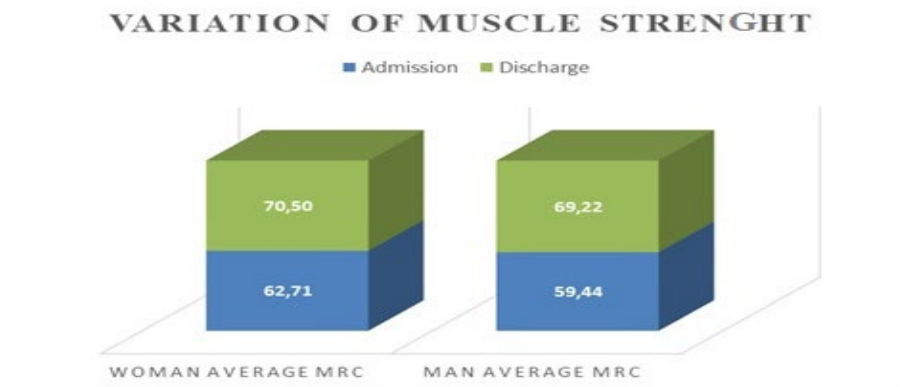


Fig no5. The evolution of the AIS/ Frankel degree

The average muscle strength at admission was 62.71 (SD 23.32) for women patients and 59.44 (SD 26.89) for male patients; and at discharge these averages were 70.5 (SD 21.23) for women and 69.22 (SD 27.06) for men.

Fig no6. Variation of muscle strenght in woman and man



Complications of the immobilization syndrome were enterocolitis (2 men), bronchopneumonia (6 male patients), urinary tract infections (6 women patients and 12 male patients) and bedsores (1 male patient).

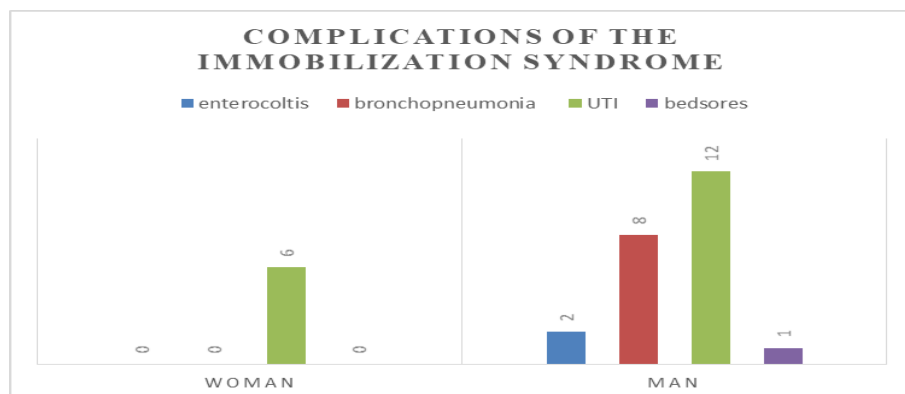


Fig no7. Complications of the immobilization syndrome

The AIS / Frankel degree at admission, was: complete lesion (AIS-A), in 1 women, incomplete lesion AIS-B (in 2 male), AIS-C (for 2 women and 10 men), AIS-D (for 4 women and 9 men).

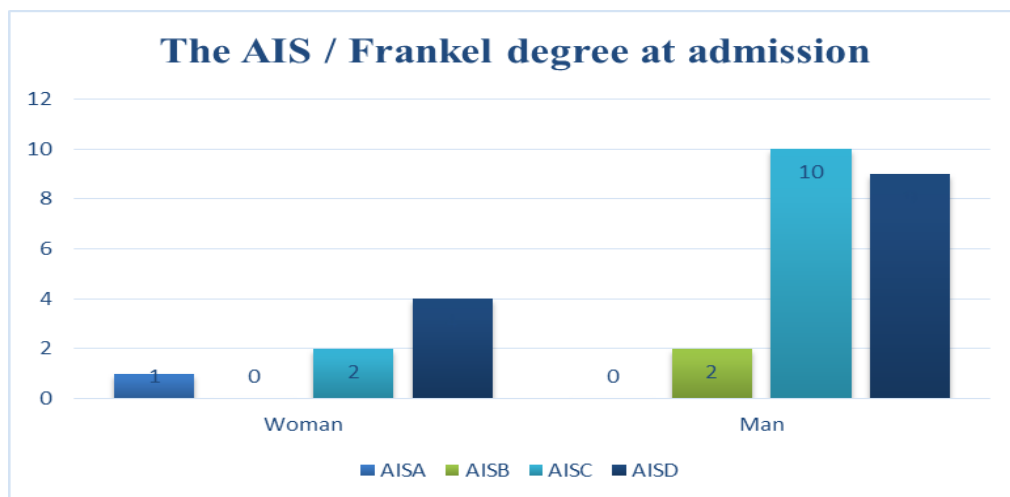


Fig no8. The AIS/ Frankel degree at admission

At discharge there were only patients with incomplete lesions AIS-C (1 women and 11 men) and AIS-D (6 women and 10 men).

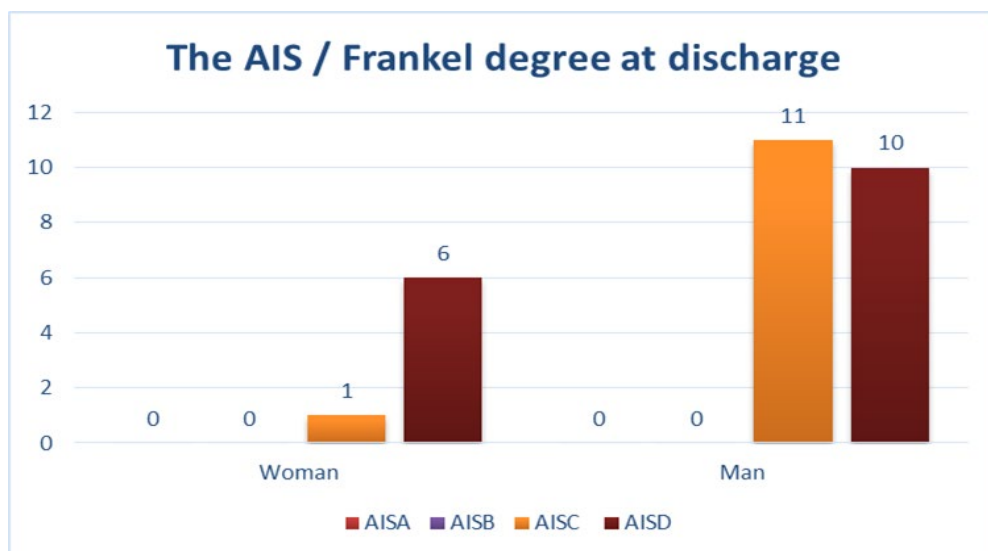


Fig no9. The AIS/ Frankel degree at discharge

An inversely proportional relationship was found between spasticity and kinetic therapy efficacy (F 0.000, Pearson -0.09), between the PENN scale scores and kinetic therapy efficacy (F 0.000, Pearson -0.24).

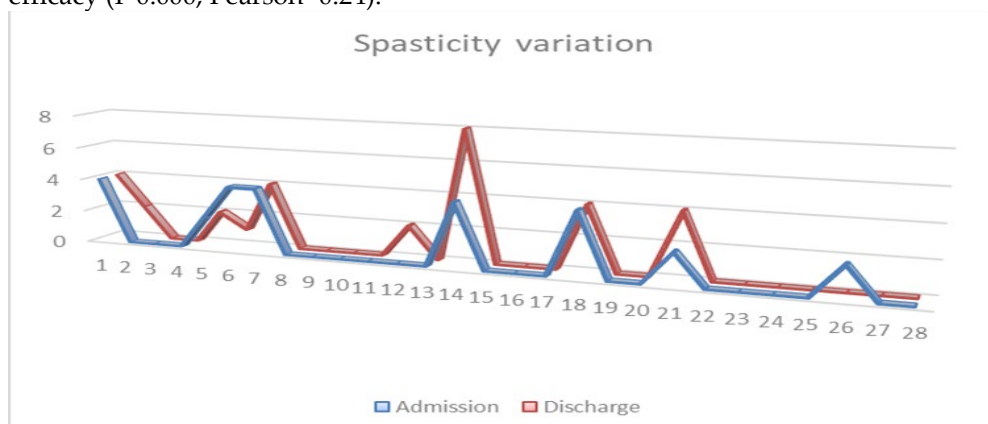


Fig no10. Spasticity variation

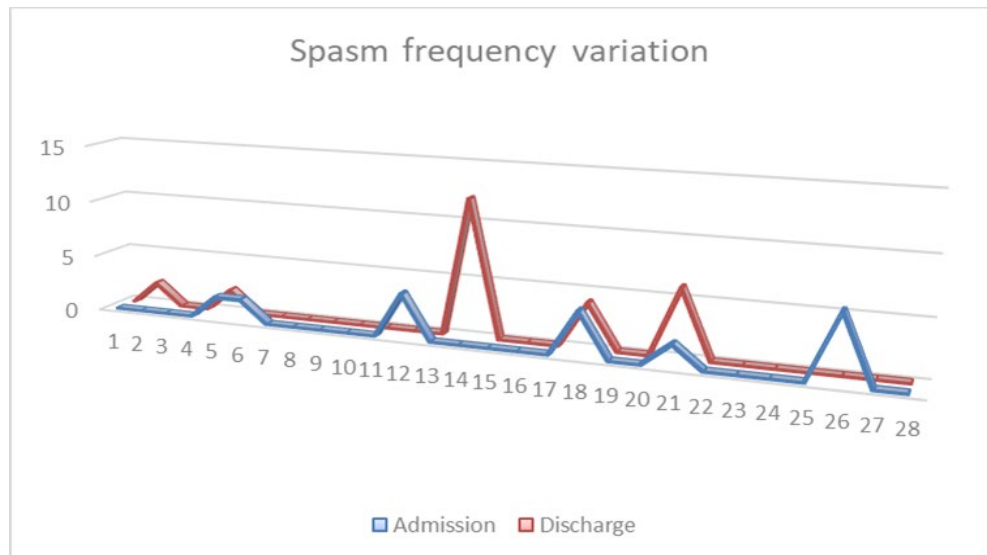


Fig no11. Spasm frequency variation

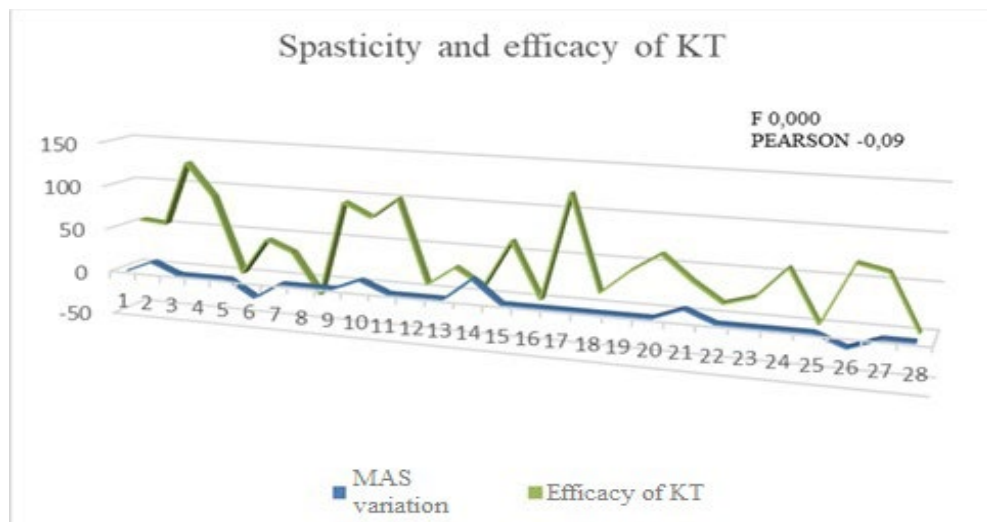


Fig no12. Spasticity and efficacy of KT

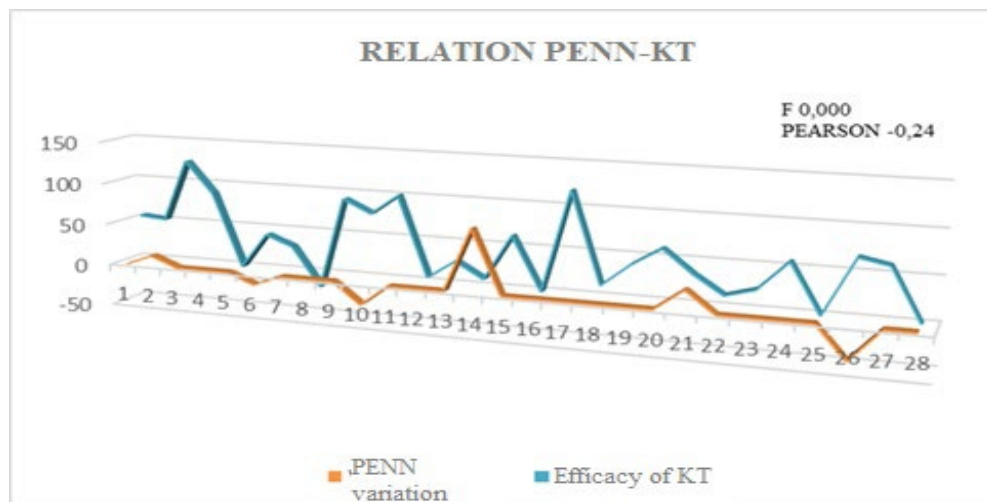


Fig no13. The relation PENN-KT

A directly proportional relationship was found between the scores assessing quality of life, FIM and the efficacy.

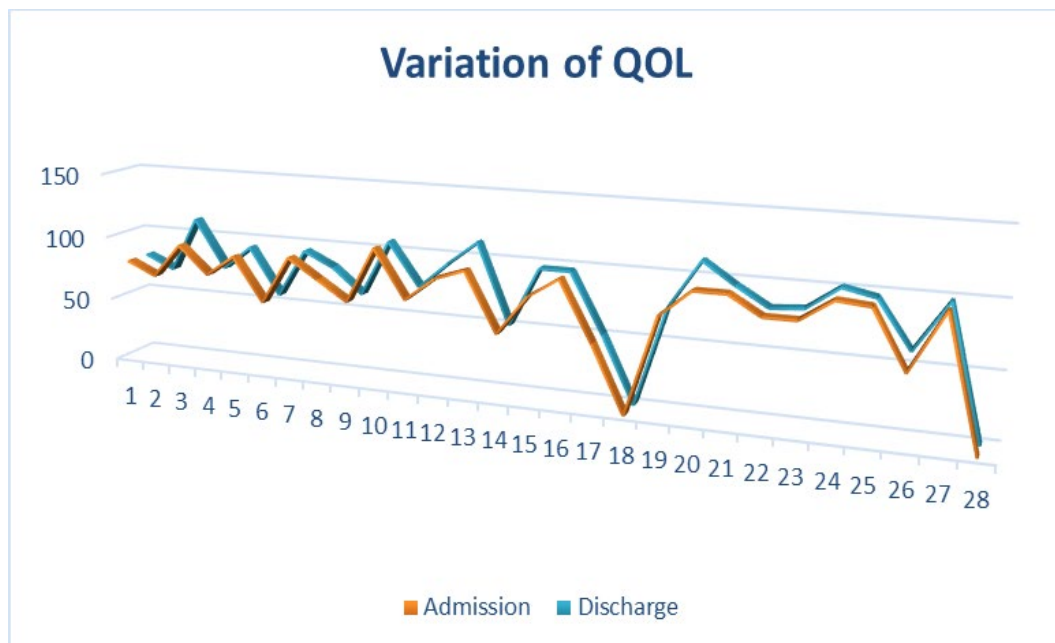


Fig no14. Variation of QOL

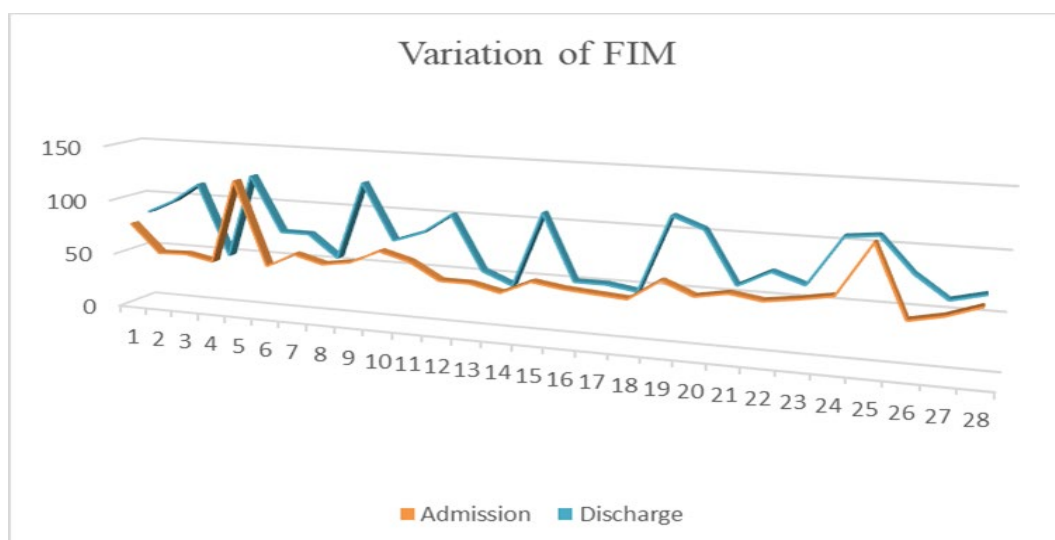


Fig no15. Variation of FIM

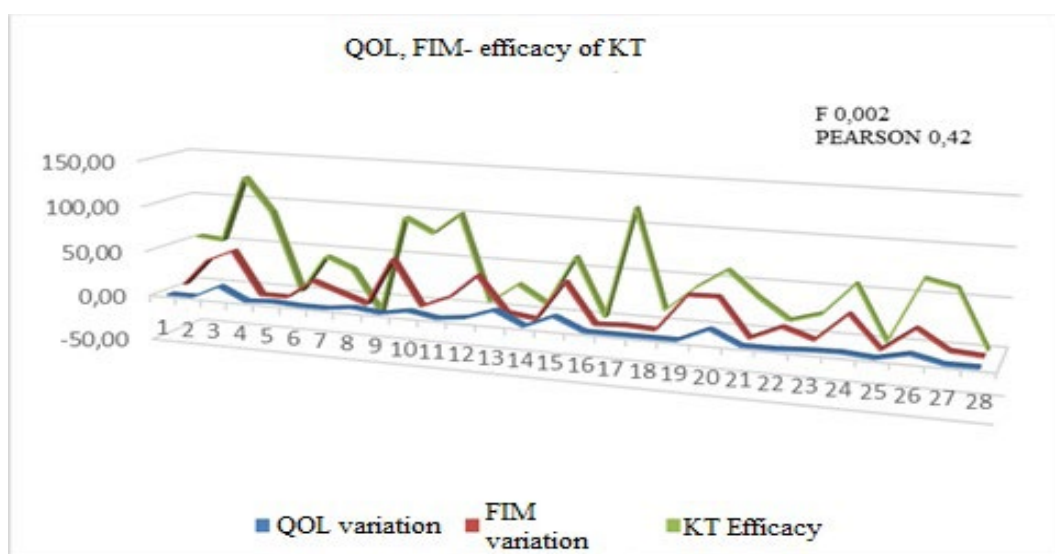


Fig no16. The QOL, FIM and efficacy of KT relation

Discussion

An inversely proportional relationship was found between spasticity and kinetic therapy efficacy (F 0.000, Pearson -0.09), between the PENN scale scores and kinetic therapy efficacy (F 0.000, Pearson -0.24) and a directly proportional relationship between the scores assessing quality of life, FIM and the efficacy of kinetic therapy (F 0.02, Pearson 0.42).

Conclusions

These results underline the importance of a multi-interdisciplinary team approach in the management of elderly tetraplegic patients after CSCI during the subacute post-lesional/post-operative stage.

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