

# Physical rehabilitation in the frailty syndrome among the elderly

## Reabilitação física na síndrome de fragilidade do idoso

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### ABSTRACT

Frail elderly are those who have intrinsic vulnerability to develop disabilities and adverse events related to health. The prevalence of frailty increases with age. The American Medical Association estimates that 40% of those over 80 years old are fragile. **Objective:** To demonstrate the results obtained with the rehabilitation protocol for the frailty syndrome at Vila Mariana Geriatric Outpatient Unit of the Israelita Albert Einstein Hospital. **Method:** Series of cases study, descriptive and retrospective of 12 elderly who have accomplish the physical rehabilitation program at Vila Mariana geriatric outpatient unit in the Israelita Albert Einstein Hospital. **Results:** The average age was 77 years, 75% of the participants were female with an average of 7,5 diagnoses. There was improvement in all areas evaluated: balance ( $p = 0.02$ ), gait speed ( $p < 0.01$ ), lower limb strength ( $p < 0.01$ ) and grip strength ( $p < 0.01$ ). Those who aged 80 or more showed improvement of 83% while those with less than 80 years old, showed an improvement of 41%. It was found that 8 of 10 seniors who met on the track at high risk for disability, hospitalization and death (SPPB equal or less than 9) was able to leave the risk range. It was showed improvement in at least one domain. No deterioration or complication was observed. **Conclusion:** The rehabilitation protocol for the frailty syndrome that was used at Vila Mariana geriatric outpatient unit was able to improve the balance, gait speed, lower limb strength and grip strength in the population studied.

**Keywords:** Aged, Postural Balance, Gait, Rehabilitation

### RESUMO

São considerados idosos frágeis aqueles com vulnerabilidade intrínseca a desenvolver incapacidades e eventos adversos relacionados à saúde. A prevalência de fragilidade aumenta com a idade e a Associação Médica Americana estima que 40% das pessoas com mais de 80 anos são frágeis. **Objetivo:** Demonstrar os resultados obtidos com o protocolo de reabilitação para idosos frágeis, implementado no Hospital Israelita Albert Einstein-Unidade Vila Mariana. **Metódo:** Estudo do tipo série de casos, descritivo, retrospectivo, com 12 idosos que cumpriram o programa de reabilitação física, do ambulatório de geriatria, da Unidade Vila Mariana, do Hospital Israelita Albert Einstein. **Resultados:** A média de idade foi de 77 anos, 75% dos participantes eram do sexo feminino e apresentavam em média 7,5 diagnósticos. Houve melhora em todos os domínios avaliados: equilíbrio ( $p = 0,02$ ), velocidade de marcha ( $p < 0,01$ ), força de membros inferiores ( $p < 0,01$ ) e força de preensão ( $p < 0,01$ ) na população estudada. Os idosos com 80 anos ou mais apresentaram melhora de 83% enquanto aqueles com menos de 80 anos mostraram melhora de 41%. Verificou-se que 8 dos 10 idosos que encontravam se na faixa de alto risco para incapacidade, hospitalização e morte (SPPB igual ou menor que 9) conseguiram sair da faixa de risco. Todos demonstraram melhora em pelo menos um domínio. Nenhuma piora ou complicação foi verificada. **Conclusão:** O protocolo de reabilitação para síndrome de fragilidade do idoso, utilizado no ambulatório da Unidade Vila Marina, do Hospital Israelita Albert Einstein, foi capaz de melhorar os domínios equilíbrio, velocidade de marcha, força de membros inferiores e força de preensão palmar na população estudada.

**Palavras-chave** Idoso, Equilíbrio Postural, Marcha, Reabilitação

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## INTRODUCTION

The aspect of functionality has been mentioned in various studies as an important predictor for morbidity, mortality, and health maintenance. It has been confirmed that it is much easier to prevent deaths than to prevent the development of disabilities associated with aging.<sup>1,2</sup>

When the compromising of functional capacity occurs to the point of impeding self-care, the load on the family and on the health system can be great. Results of research done in the city of São Paulo showed that 53% of the elderly population studied needed assistance for at least one daily life activity, 29% needed assistance for up to three of those activities, and 17% needed assistance to perform four or more activities.<sup>3</sup>

Frailty determinants may precede the state of disability and are considered markers - or, better, predictors of disability. They are also related to unfavorable clinical outcomes and death.<sup>1,2,4,5</sup>

The phenotype described by Fried for such syndrome is considered the gold standard for its diagnosis and it has 5 components: weight loss (unintentional loss of 4.5 Kg or more in the preceding year), sensation of exhaustion, physical inactivity, low gait speed, and diminished hand grip. Pre-frailty characterizes those with one or two positive factors and frailty characterizes those with more than two factors.<sup>6,7</sup>

More recently, the MOBILIZE Boston Study<sup>8</sup> validated an evaluation methodology for the frailty syndrome (FS) that is more easily applicable. This evaluation has three components: unintentional weight loss (more than 4.5Kg in a year); the inability to get up from a chair without the help of the hands five consecutive times; the sensation of exhaustion (Have you had the sensation of not having the strength to perform your usual activities in the last few weeks?). They defined a pre-frail person as one who shows only one component and the frail person as showing two or more components.<sup>8</sup>

Recent studies have demonstrated that with the appropriate physical rehabilitation program it is possible to prevent or even revert the frailty condition. There is a consensus that physical activity is the best treatment for frailty among the elderly, however, there is no consensus as to the type of exercise. Recent reviews point to multicomponent modalities as being the most recommended. The most mentioned components are: resistance exercises and balance training.<sup>9</sup>

## OBJECTIVE

The objective of this study was to demonstrate the results obtained with the rehabilitation protocol for the frail elderly implemented at the Vila Mariana Geriatric Outpatient Unit of the Albert Einstein Israeli Hospital.

## METHOD

This was a descriptive, retrospective study, with 12 elderly persons who completed the physical rehabilitation program of 4 months in the Vila Mariana geriatric outpatient unit of the Albert Einstein Israeli Hospital.

Initially, the participants were evaluated by the physiatrist to verify whether they fitted into the frailty or pre-frailty criteria of the FS battery and whether they had any counter indications. Those who fit into the following criteria were sent to the physiotherapy department:

### Inclusion criteria

Elderly persons with one or more of the frailty criteria (according to the criteria of the FS study) and independent deambulation.

### Exclusion criteria

Clinical instability, diagnosis of dementia, and osteoarticular pathologies that impeded the performance of the proposed exercises.

### Instruments to evaluate the results

Short Physical Performance Battery (SPPB): it is an instrument recommended internationally to evaluate the risk of functional loss in the elderly. Patients who score 9 or less show greater risk of suffering falls, hospitalization, functional decline, and death. The battery evaluates the domains of muscle strength, balance, and gait speed.<sup>4,10</sup>

Hand Grip (HG): it tests the grip strength of the hand through a dynamometer and it is related to the risk of falls and functional loss when its value is less than 17.<sup>1</sup>

Timed up and go (TUG): it measures the time the elderly person takes to get up from a chair, walk 3 meters at normal speed, with or without a gait assistance, and return to the chair. A time greater than 15 seconds predicts the risk of falls and functional loss.<sup>11</sup>

### Intervention

The participants were distributed into groups of 3 patients for therapist. The frequency was three 60-minute sessions per week for each therapy, totaling 16 weeks of rehabilitation. The

intervention components were: warm-up, strengthening, balance training, and cooling/stretching. The warm-up period lasted 10 minutes and included aerobic activities such as walking in the garden, on a treadmill, or riding a bicycle.

The 20-minute strengthening exercises included resistance exercises for the biceps brachii, triceps brachii, pectoralis, latissimus dorsi, hip flexors, hip extensors, knee flexors and extensors, adductors and abductors, trunk extensors, and abdominals. This intervention was made through mechanotherapy, with 3 cycles of 10 to 15 repetitions for each muscle group. The load progression was adjusted, according to the tolerance of each participant. The beginning had 3 series of 10 repetitions and evolved to 12 to 15 repetitions. The load was increased after the elderly participants reported ease while performing the exercises.

The 20-minute balance training consisted of standing exercises with various support bases such as mats, a trampoline, a balance disk, foam, and various feet positions (together, heel/hallux and tandem), and of walking with sudden change of direction, walking skipping obstacles, picking up objects from the ground, and continuing to walk, all in a circuit. Exercises with rotation and lateralization of the head, alternating visual and auditory stimuli, and double task exercises were also associated with the routine.

Body perception exercises, relaxation, and stretches (lasting 30 seconds each) were used for the 10-minute cooling period.

### Statistical analysis

The analysis was made through the *Student t* test, considering  $p < 0.05$  as significant.

## RESULTS

There was improvement in the following domains evaluated: balance, gait speed, strength of the lower limbs, and grip strength in the population studied (Table 1).

The age average was 77 years, 75% of the participants were female and showed an average of 7.5 diagnoses. Stratifying in large disease groups: 9 had cardiovascular diseases, 5 had depression, 4 had *diabetes mellitus*, and 4 had osteoarticular conditions.

The participants aged 80 or older showed an improvement of 83%, while those younger than 80 showed an improvement of 41%.

It was seen that 8 out of 10 elderly persons who were at high risk for disability, hospitalization, and death (SPPB equal or less than 9) were able to leave this risk group.

**Table 1.** Results of the analysis by the *Student t* test

	Balance (SPPB)	Gait (SPPB)	Strength (SPPB)	Total SPPB	TUG	HG
Beginning	Average 2.91 SD ± 1.11	Average 3.41 SD ± 0.75	Average 1.25 SD ± 0.92	Average 7.75 SD ± 2.34	Average 15.07 SD ± 7.31	Average 13.66 SD ± 6.88
End	Average 3.9 SD ± 0.27	Average 3.75 SD ± 0.59	Average 2.91 SD ± 1.18	Average 10.66 SD ± 1.69	Average 10.33 SD ± 3.81	Average 15.70 SD ± 5.86
p value	0.02	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

SPPB: Short Physical Performance Battery; TUG: Time up and go; HG: Hand grip

All of them showed improvement in at least one domain. No worsening or complication was found.

## DISCUSSION

As reported by Clegg et al.<sup>2</sup> it is essential to identify the frailty syndrome in the elderly early on, for in this way the appropriate and directed intervention may be implemented, and more effective results may be achieved.

Many studies have shown that specific physical intervention may be the best way of preventing frailty.<sup>12-15</sup> Exercise seems to be the most effective intervention of all to improve the quality of life and functionality of the elderly.<sup>14,15</sup>

The multicomponent physical rehabilitation program, composed of exercises specific and directed to strengthening and balance training seems to be the most recommended for the frail elderly, however, there is no consensus as to the frequency, intensity, or type of exercise.<sup>9</sup>

It is noteworthy that, despite the great number of morbidities, in this first sample of patients, there were no clinical complications. This fact may be related to the very rigid

selection criteria and to the fact of it being a low intensity physical approach.

Studies such as clinical trials, with a larger number of participants, must be made to obtain a higher level of evidence for the proposed therapy. However, due to the significant improvement of all the patients who were submitted to the intervention described here, this work has great value as a preliminary study.

## CONCLUSION

The rehabilitation protocol for frailty syndrome used in the Vila Mariana Geriatric Outpatient Unit of the Albert Einstein Israeli Hospital improved the domains of balance, gait speed, strength of the lower limbs, and grip strength in the population studied.

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