



## GROUP PHYSICAL THERAPY PROGRAM FOR PATIENTS WITH PARKINSON DISEASE: alternative rehabilitation

*Programa de fisioterapia em grupo para pacientes parkinsonianos: alternativa para a reabilitação*

**Daniela Dias Consolini Pereira<sup>a</sup>, Silvana Aparecida Siqueira<sup>b</sup>,  
Teresa Cristina Alvisi<sup>c</sup>, Luciana Auxiliadora de Paula Vasconcelos<sup>d</sup>**

<sup>a</sup> Fisioterapeuta, Pontifícia Universidade Católica de Minas Gerais, Câmpus de Poços de Caldas, Minas Gerais, MG - Brasil, e-mail: daniela.consolini@yahoo.com.br

<sup>b</sup> Fisioterapeuta, Pontifícia Universidade Católica de Minas Gerais, Câmpus de Poços de Caldas. Minas Gerais, MG - Brasil, e-mail: silvanaacv@yahoo.com.br

<sup>c</sup> Mestre em Gerontologia. Pontifícia Universidade Católica de Minas Gerais, Câmpus de Poços de Caldas, Minas Gerais, MG - Brasil, e-mail: alvisite@pucpcaldas.br

<sup>d</sup> Pós-Doutora em Anatomia, Doutora em Neurociências e Comportamento, Pontifícia Universidade Católica de Minas Gerais, Câmpus de Poços de Caldas, Minas Gerais, MG - Brasil, e-mail: lucivasc@pucpcaldas.br

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### Abstract

**INTRODUCTION:** Parkinson's disease is a neurological disorder causing loss of functional abilities and progressive loss of independence despite medical treatment. **OBJECTIVE:** The aim of this study was to evaluate the effects of group physical therapy on motor performance and activities of daily life in patients with Parkinson Disease (PD). **METODOLOGY:** Five patients (both sex, average age: 69.2 years, mean time-period of PD: 5.2 years, average Hoehn and Yahr score: 3) referred to the Clinic of Physical Therapy of Pontifical Catholic University of Minas Gerais in Poços de Caldas city, were evaluated (initial, intermediate and final stages) using: the Berg Balance Scale (balance static and dynamic evaluation); Timed "Up & Go" Test (gait evaluation); Barthel Index (activities of daily life evaluation). Thirty-five sessions were done, aiming to: improve general mobility, static and dynamic balance using hearing and visual cues. **RESULTS:** The data shows a statistical difference in balance, gait and daily life performance for the average scores comparing three stages of evaluation ( $p < 0.05$ ; block variance analysis followed by multiple comparison test), where the intermediate and final evaluation provided a better score compared with the initial one. **CONCLUSION:** Our data provided promising results for the use of group physical therapy for patients with PD, providing a cost-effective alternative in physical therapy.

**Keywords:** Group therapy. Physical therapy. Parkinson disease. Rehabilitation.

## Resumo

**INTRODUÇÃO:** A doença de Parkinson é uma desordem neurológica que causa perda de habilidades funcionais e progressiva perda de independência, mesmo mediante tratamento farmacológico apropriado. **OBJETIVOS:** O presente estudo teve por objetivo avaliar os efeitos de um programa de fisioterapia em grupo sobre o desempenho motor e atividades de vida diária em pacientes parkinsonianos. **METODOLOGIA:** Cinco pacientes (ambos os sexos, idade média: 69,2 anos, tempo médio de desenvolvimento da Doença de Parkinson: 5,2 anos, média do estágio da doença pela teste de Hoehn and Yahr: 3), provenientes da Clínica de Fisioterapia da Pontifícia Universidade Católica de Minas Gerais em Poços de Caldas, foram avaliados em três momentos: inicial (antes do início das sessões), intermediário e final (ao término das sessões). Foram usadas as seguintes escalas: escala de equilíbrio de Berg (equilíbrio estático e dinâmico); "Timed 'Up & Go' Test" (marcha); índice de Barthel (atividades de vida diária). Foram realizadas 35 sessões, tendo como objetivos: melhora na mobilidade geral, treino de equilíbrio estático e dinâmico utilizando pistas auditivas e visuais. **RESULTADOS:** Os resultados mostram uma diferença estatisticamente significativa no equilíbrio, marcha e atividades de vida diária para a média das pontuações, comparando-se os três momentos de avaliação ( $p < 0.05$ ; análise de variância em bloco seguida por teste de múltiplas comparações), onde as avaliações intermediária e final obtiveram melhores pontuações em comparação à avaliação inicial. **CONCLUSÃO:** Os dados fornecem resultados promissores quanto ao uso de um programa de fisioterapia em grupo para pacientes parkinsonianos, caracterizando alternativa de bom custo-benefício para a fisioterapia.

**Palavras-chave:** Terapia de grupo. Fisioterapia. Doença de Parkinson. Reabilitação.

## INTRODUCTION

Parkinson disease (PD) is a progressive neurodegenerative disorder of unknown cause in which the ability to control voluntary movement is lost due to the loss of dopaminergic neurons in the *substantia nigra pars compacta*, causing changes in the functional organization of the basal ganglia (1, 2). It is known that this degeneration of dopaminergic pathways produces neurotransmitter imbalances in the basal ganglia, especially in the *striatum* (3). It is estimated that PD affects at least 1% of the population over age 50, increasing its prevalence with age (2, 4).

The first clinical signs appear when approximately 60% to 80% of the nigrostriatal dopaminergic pathway has deteriorated. Rigidity, akinesia or bradykinesia and resting tremors represent the main motor symptoms of the PD and usually appear early in the course of the disease. Depending on the severity of the disease, postural instability, with episodes of freezing of gait, decreasing step length and trunk mobility problems, can contribute to increased risk of falling. Therefore, in time, patients face functional activity disorders that lead to serious difficulties with activities of daily living, which can result in need for custodial care (5).

In addition to these classical symptoms, there is a high prevalence of impaired non-motor functions including sensorial, emotional, cognitive and autonomic loss. It is known that 40% of patients with PD have depression symptoms; 20% present cognitive decay, especially related to memory disturbances (6). Sleep disorders have been described in the clinical settings of PD, such as nocturnal insomnia or daytime hypersomnolence (7). For a recent review of clinical features of PD, see Stoessl (2008) (8).

The current medical approach to PD is a symptomatic type, mainly comprising dopaminergic replacement therapy (levodopa, L-dopa), and/or dopamine agonists and surgery (deep brain lesion or stimulation) (9-11). Some novel therapies still being tested such as neurotrophic factors and stem cell-based therapy represent a potential treatment for PD (12, 13).

In general, the combination of pharmacotherapy with rehabilitation programs is the optimal treatment strategy for controlling symptoms in that physical therapy aims to teach people with PD how to minimize the disabling effects of motor and sensory impairments, improving their quality of life (1, 3, 14, 15).

Often physical therapy, both individual or group, work in specific areas such as transfers, posture, reaching and grasping, balance, gait and physical capacity, and is comprised of mobility exercises, gait training (with or without external cues), training of daily activities, relaxation therapy and breathing exercises (6, 16-18).

Groups are used in physical therapy to improve global health status and bring relief from typical disability symptoms of several diseases, competing with individual rehabilitation at least in short-term follow-up (19, 20). Therapeutic groups have been beneficial to the health care system by decreasing the cost and time spent for rehabilitation (21). Especially for patients with PD, little information is available on the implications of group therapy for the motor rehabilitation process. Monnin and co-workers emphasize the usefulness of specific neurorehabilitation programs, including group therapy procedures in the global management of PD (22).

The aim of this study was to evaluate the effects of a group physical therapy program on the motor performance (walking ability, balance and postural control) and its influence upon the activities of daily life in patients diagnosed with PD.

## METHOD

**Patients:** Five patients diagnosed with PD referred to the Clinic of Physical Therapy of Pontifical Catholic University of Minas Gerais in Poços de Caldas were included in the study. All were eligible having fulfilled the inclusion criteria for the study: to be in continuous and supervised pharmacologic treatment; to have independent gait; not presenting several impairing cognitive (Mini Mental State Examination) and cardiovascular functions (medical information) or other neurological deficits than those caused by PD. All patients gave written informed consent and the protocol was approval by the Pontifical Catholic University of Minas Gerais ethics committee (process CEP 2004/77). The clinical characteristics of all five patients are shown in Table 1, including the disease staging (Unified Parkinson Disease Rating Scale – UPDRS - and Hoehn and Yahr Staging of Parkinson's Disease) and Schwab and England Activities of Daily Living score (part of UPDRS) (23).

TABLE 1 - Demographic and clinical data of the patient with Parkinson Disease group

Patient	Sex	Age (years)	Time-period of PD (years)	UPDRS score (sec 1-3)	H & Y score	Schwab and England score (%)
1	f	65	3	37	3	80%
2	m	66	1	50	3	80%
3	f	77	15	49	3	70%
4	m	74	3	61	3	70%
5	m	64	4	67	3	70%
Av±SD		69,2±5,9	5,2±5,6	52,8±11,6	3±0	0,74±0,05

Note: PD, Parkinson disease; UPDRS, Unified Parkinson Disease Rating Scale (sections 1-3); H & Y, Hoelm and Yahr Staging of Parkinson's Disease; Schwab and England, Schwab and England Activities of Daily Living; Av; average; SD, standard deviation.

**Evaluation:** all patients were evaluated in three stages: initial (before the procedure), intermediate (after the 18<sup>th</sup> session) and final (immediately after the final session). All evaluations were performed by a trained physiotherapist to guarantee the correct use of the measuring scales. The evaluation included: Berg Balance Scale (24) for balance static and dynamic evaluation; Timed "Up & Go" Test (25) for gait evaluation; Barthel Index (26) for activities of daily life evaluation.

**Procedure:** thirty-five group physical therapy sessions were carried out, 60 min each, three times a week. The approach used during sessions aimed to improve: general mobility, using muscular strength, free movement and relaxing exercises; trunk control, using trunk displacement and rotation during dynamic exercises performed in a sitting posture; static balance, using the same strategies for trunk control but in a standing position; dynamic balance and gait, using free gait; gait with obstacles, stairs, ramp, uneven ground, performed in and outside the room. Throughout the procedures, especially for gait training, hearing and visual cues were used to provide several stimulus associations for the patients during their training. All exercises were performed in a group so that each patient could observe, help and encourage each other. The presence of music was also constant during sessions.

**Statistical Analysis:** Because our data presented a normal distribution, a variance analysis using blocks followed by a multiple comparison test (Bonferroni's test for walking speed and Berg balance scale; and Tukey's test for Barthel Index) were applied to verify the difference between the average of each one of the measuring scales used, in the initial, intermediate and final evaluations, with a minimum level of significance of 0.05.

## RESULTS

**Balance:** For the five patients submitted to group physical therapy, the data obtained by Berg Balance Scale showed statistical difference between the three stages of evaluation (initial, intermediate and final) ( $p < 0.05$ ) as seen in Figure 1. It can be seen that the average of the initial evaluation is lower than the intermediate and final averages, indicating an improvement of balance performance for these patients during this specific test. There was no statistical difference between intermediate and final evaluation ( $p > 0.05$ ) although in qualitative analysis it is possible to notice an increase of the average score in the final evaluation compared with intermediate one.

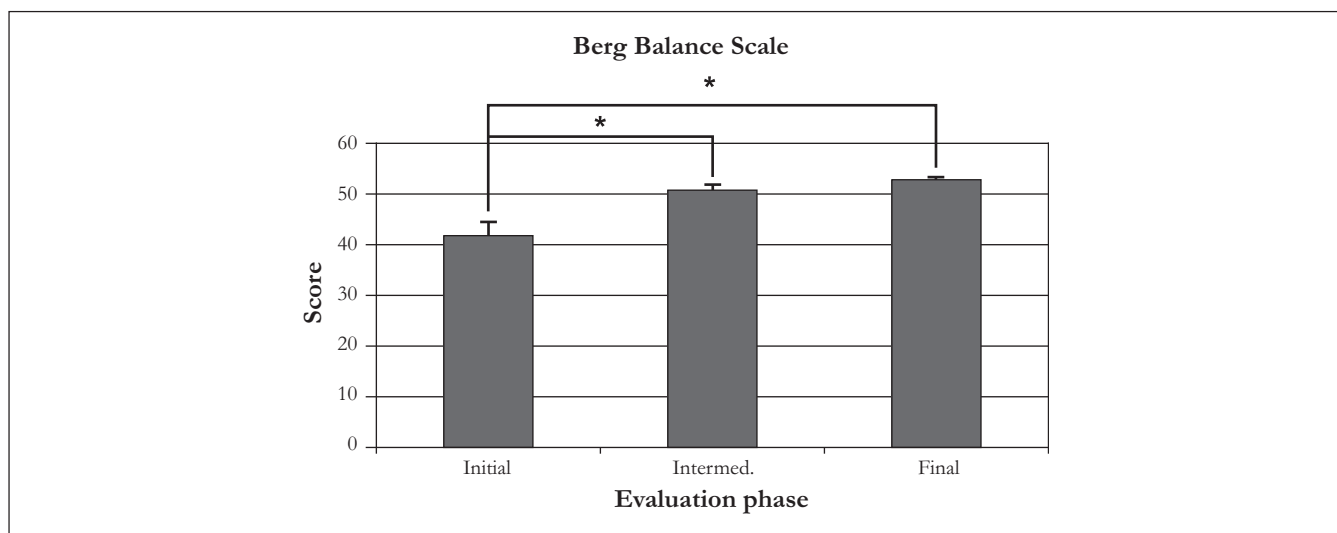


FIGURE 1 - Berg Balance Scale. Mean and Standard error of mean of patient's scores in Berg balance scale during three stages of evaluation (initial – before procedure starts; intermediate – middle of procedure period; final – end of procedure; \* $p < 0.05$ ; analysis of variance for groups of data with post hoc multiple comparisons by Bonferroni method). Abbreviation: Intermed.; intermediate

**Gait:** Using the Timed “Up & Go” test, an increase was recorded in the average gait velocity comparing the initial, intermediate and final evaluation stages (comparison initial x intermediate:  $p < 0.05$ ; comparison initial x final:  $p < 0.01$ ). It can be seen that the average of the initial evaluation is lower than the intermediate and final averages, indicating an improvement of gait velocity of these patients

during the Timed “Up & Go” test. There is no statistical difference between intermediate and final evaluation ( $p > 0.05$ ) although, as in the Berg Balance Scale, a qualitative increase of the average score can be seen comparing the intermediate and final evaluations (Figure 2).

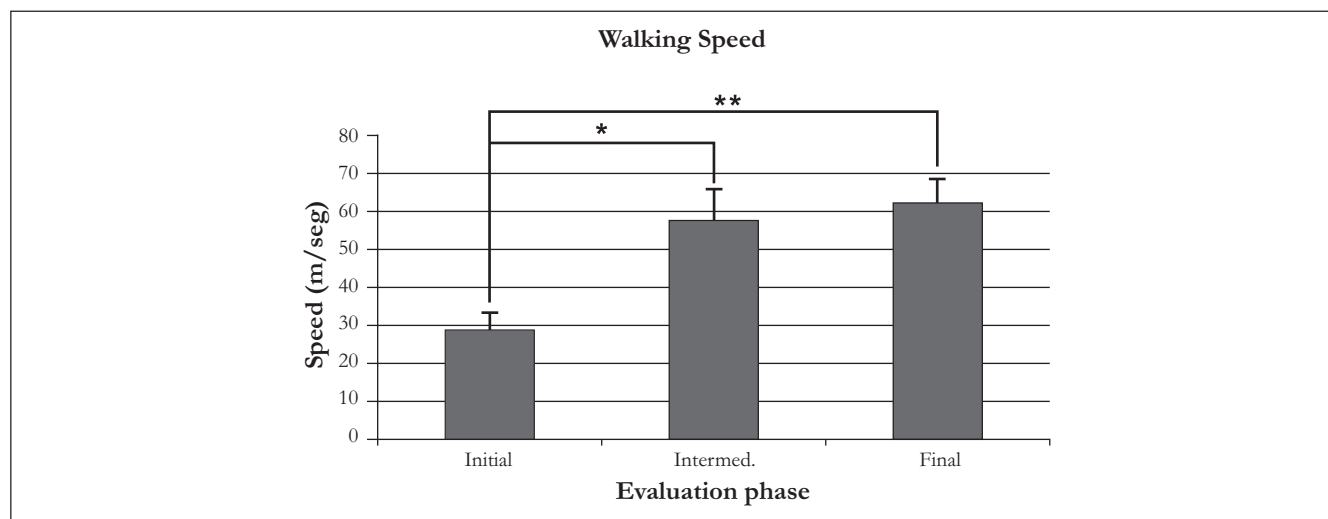


FIGURE 2 - Walking speed–Timed “Up & Go” test (7,5 m). Mean and Standard error of mean walking speed during a 7.5 m course during three stages of evaluation (initial – before procedure starts; intermediate –middle of the procedure period; final –end of the procedure; \* $p < 0.05$ ; \*\* $p < 0.01$ ; analysis of variance for groups of data with post hoc multiple comparisons by Bonferroni method). Abbreviation: Intermed.; intermediate

**Activities of Daily Life:** As seen in table 1, all patients had a moderate level of independence (74%), measured by the Schwab and England Activities of Daily Life in UPDRS (23), in the initial instance of the procedure. The average was 74% which can be functionally translated as patients who are not completely independent, having more difficulties with some essential activities, taking three or four times longer for them to carry out the procedure and spending the most part of their day with basic activities. Using the Barthel Index, this observation could be confirmed in the initial evaluation. However, during the group physical therapy procedure, the average Barthel Index score increase was statistically significant comparing the initial and intermediate evaluation stages ( $p < 0.05$ ). (Figure 3).

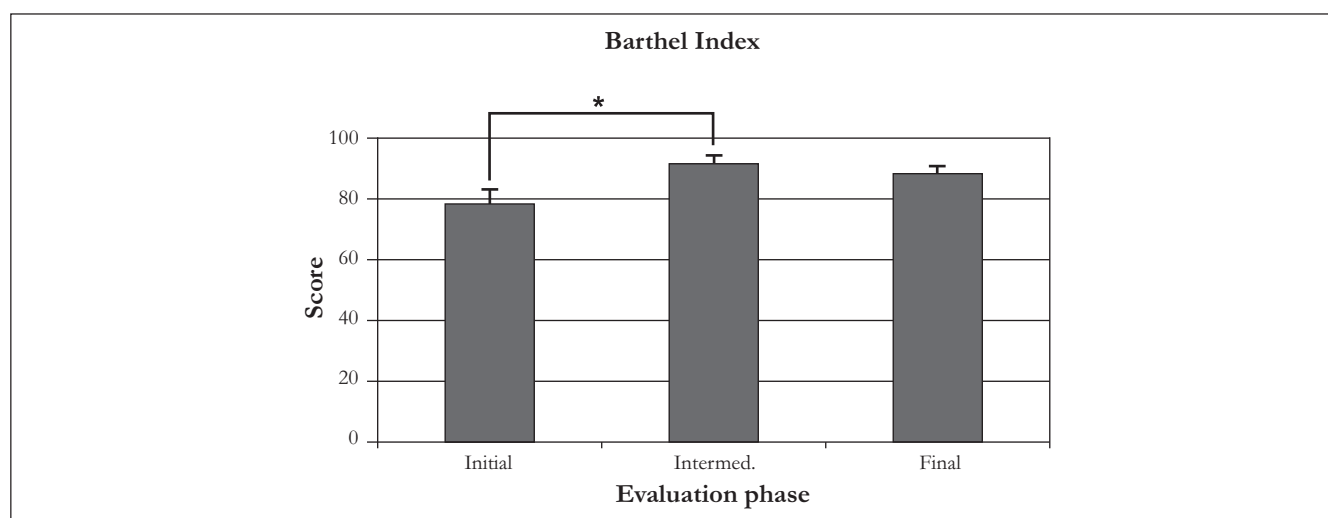


FIGURE 3 - Dependency level in activities of daily life–Barthel Index. Mean and Standard error of mean of the patients scores in Barthel Index during three different stages of evaluation (initial – before procedure starts; intermediate – middle of procedure period; final – end of procedure; \* $p < 0.05$ ; analysis of variance for groups of data with post hoc multiple comparisons by Tukey method). Abbreviation: Intermed.; intermediate.

## DISCUSSION

Our results suggest that group physical therapy improves gait, balance and activity of daily life performance in patients with PD.

Chen et al. (27) observed a risk reduction for PD in men in the highest category of vigorous physical activity. It was already seen that physical exercise induces an increase of glial-derived and central nervous system neurotrophic factors that have neuroprotective effects for dopaminergic neurons inducing a neuroplasticity process. It can also activate the dopaminergic system and increase dopamine availability in the *striatum* (15, 27). Consequently, physical therapy, both individual and group treatment, represents an important approach for these patients.

After a period of 5 to 8 years from the initial diagnosis and treatment of PD, which was the average of the period from initial diagnosis and treatment for our study groups, physical therapy must aim to increase movement speed and amplitude, optimize postural alignment and maintain postural stability at times when the medication does not maintain patients within the normal range. At this stage, balance impairment is one of the most dangerous symptoms since, in association with gait deficit and gait freezing problems, it can increase the risk of falling (3). In our study we used several strategies to improve balance and gait with patients. The exercises performed for trunk control and the static and dynamic activities used during the therapeutic procedure, with external cues, increased both of these parameters in our patients. The Berg Balance scale and the Timed "Up & Go" test showed statistical difference between initial and intermediate and final stages of the evaluation.

It is known that visual cues may contribute to attention and/or vision depending on the situation. A common mechanism related to this phenomenon may be the shunt of the basal ganglia-supplementary motor area interacting either by a more significant involvement of the motor cortex through attention or by the activation of a specific visuomotor pathway for external stimuli. Therefore, this training can reduce gait-freezing complications, improving balance and dynamic motor control, decreasing risk of falling (28).

Studies have shown that group physical therapy, applied to different pathologies, can improve global health status and relieve characteristic disability symptoms, as seen in this study of patients with PD. It is possible that the improvement provided by group physical therapy is partly mediated by increased fitness and relief of stiffness (29). Some reviews point to some specific areas for physical therapy in patients with PD: transfer, posture, reaching and grasping, speech ability, balance, gait, and physical capacity, which are working using several strategies as in the use of cueing to improve gait; cognitive movement to improve transfers; specific balance exercises, training and joint mobility and muscle power to improve physical capacity (30, 31). Some of these described goals and strategies were used in our group physical therapy sections, as discussed above.

Our patients showed themselves not completely independent in the initial evaluation by the Schwab and England activities of daily life scale present in UPDRS, although they had a good average (70% independence). Nonetheless, we observed an improvement of daily life performance in our patients, measured by the Barthel Index, mainly between initial and intermediate evaluations. When we compare the initial and final or intermediate and final evaluations we could not see a statistical difference between these stages. This probably occurred because one of the patients had a personal issue that interfered with his evaluation. Yet, even this problem had no direct relation with physical therapy process. However, we can see in a qualitative analysis that the value of the average score in final evaluation is greater than the initial one, suggesting improvement of activities of daily life performance in these patients.

The main aim of the Index is to establish a patient's degree of independence, whether physical or verbal or however minor. This index, although not typically used to evaluate patients with PD, has been largely used to evaluate elderly patients. Nevertheless, some studies have used the Barthel Index in patients with PD to measure daily living function (32-35).

The patient benefits from group physical therapy go beyond functional improvements, but can also provide greater psychological and social awareness, and educational opportunities. Patients in groups interact with others facing similar situations and actively assist each other with their problems,

ultimately contributing to their global socialization including family and social groups. Another important characteristic of group physical therapy is that it represents a cost-effective treatment alternative that maximizes staff productivity, decreasing labor and/or institutional costs compared with an individual approach (36).

It is common during clinical research to use different scales to measure one single or similar signs, since all scales have certain limitations. Thus, data from these scales corroborate the findings of each other. Consequently, in this study, we used two different scales to measure the functionality of the patient: the Barthel Index – for quality of life; and the Schwab and England Activities of Daily Living – for activities of daily life. The latter was used in the initial evaluation, to verify the patient's functional motor condition and because it was included in UPDRS. The Barthel Index was used to verify the impact of physical therapy in the patient's life because during the initial evaluation, all patients achieved a good score on the Schwab and England Activities of Daily Living scale. Despite that all scales used herein were previously tested and their validity was confirmed, the Barthel Index could be substituted for other quality of life scales specific for patients with PD (PDQ-39, for example), to provide more specific data.

We recognize that there are limitations in the design of this study. The small sample size, the absence of a control group and a recall reevaluation to control the function improvements following treatment, limit the application of our data in the general use of group physical therapy for patients with PD.

Nevertheless, our data supports the use of group physical therapy for patients with PD, since we could see a significant improvement in balance, gait and daily life performance in our patients.

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