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Perfetti-based exercise program for mild cognitive impairment in older adults

Programa de Ejercicios basado en el método Perfetti para el deterioro cognitivo leve en adultos mayores

Programa de exercícios baseado em Perfetti para comprometimento cognitivo leve em idosos

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ABSTRACT

Background: Mild cognitive impairment in older adults is gaining more strength as a social problem in recent years, since there has been no timely treatment, which gives way to older adults suffer significant changes in their normal development of activities of daily living. Objective: To implement an exercise program using the Perfetti Method that allows us to improve cognitive processes and therefore help the recovery of the development of activities of daily living of older adults with mild cognitive impairment. Methods: For this project, the Mini Mental teas were used to evaluate cognitive impairment, in addition to the Barthel index, to show the degree of affection in activities of daily living, which were carried out pre and post application of an exercise program based on the Perfetti Method for mild cognitive impairment in older adults. Results: After having analyzed the results, it was evidenced that, with cognitive stimulation, cognitive processes are improved in older adults, which, if a significant improvement is seen in the execution of activities of daily. Conclusions: The application of the exercise program based on the Perfetti method, if it has a positive effect, in the cognitive and physical processes of the elderly.living.

Keywords: Cognitive Decline; Exercise Therapies; Cognitions; Functional Status; Activities of Daily Living.

RESUMEN

Antecedentes: El deterioro cognitivo leve en personas adultas mayores, va cobrando más fuerza como una problemática social, en los últimos años, ya que no se ha dado un oportuno tratamiento, lo que da paso a que las personas adultas mayores sufran cambios significativos en su desarrollo normal de las actividades de la vida diaria. Objetivo: Implementar un programa de ejercicios mediante el Método Perfetti que nos permita mejorar los procesos cognitivos y por consiguiente ayudar a la recuperación del desarrollo de las actividades de la vida diaria de las personas adultas mayores con deterioro cognitivo leve. Métodos: Para este proyecto se utilizaron el tes de Mini Mental, para evaluar el deterioro cognitivo, además del índice de Barthel, para evidenciar el grado de afección en las actividades de la vida diaria, mismos que se llevaron a cabo pre y post aplicación de un programa de ejercicios basado en el Método Perfetti para deterioro cognitivo leve en personas adultas mayores. Resultados: Después de haber analizado los resultados se evidencio, que, con la estimulación cognitiva, se mejoran los procesos cognitivos en las personas adultas mayores, con lo cual, si se ve una mejora significativa en la ejecución de las actividades de la vida diaria. Conclusiones: La aplicación del programa de ejercicios basado en el método Perfetti, si tiene un efecto positivo, en los procesos tanto cognitivos como físicos de las personas adultas mayores.

Palabras clave: Deterioro Cognitivo Leve; Terapia por Ejercicio; Cognición; Estado Funcional; Actividades Cotidianas.

RESUMO

Antecedentes: O comprometimento cognitivo leve em idosos, vem ganhando mais força como problema social, nos últimos anos, uma vez que não foi dado tratamento oportuno, o que dá lugar a idosos sofrerem alterações significativas no seu desenvolvimento normal das atividades da vida diária, neste contexto a pesquisa foi realizada, sobre a implementação de um programa de exercícios utilizando o método Perfetti. Objetivo: Implementar um programa de exercícios utilizando o Método Perfetti que nos permita melhorar os processos cognitivos e, portanto, ajudar na recuperação do desenvolvimento das atividades de vida diária de idosos com comprometimento cognitivo leve. Métodos: Para este projeto, utilizou-se o Mini Chá Mental para avaliar o comprometimento cognitivo, além do índice de Barthel, para mostrar o grau de afeto nas atividades de vida diária, que foram realizadas antes e após a aplicação de um programa de exercícios baseado no Método Perfetti para comprometimento cognitivo leve em idosos. Resultados: Após a análise dos resultados, ficou evidente que, com a estimulação cognitiva, os processos cognitivos são melhorados em idosos, com os quais, se há uma melhora significativa na execução das atividades de vida diária dos mesmos, o que poderia ser demonstrado após a análise pré e pós-teste. Conclusões: Concluiu-se que a aplicação do programa de exercícios baseado no método Perfetti, se tem um efeito positivo, nos processos cognitivos e físicos dos idosos, o que permitiu cumprir o objetivo principal deste estudo, que é; implementar um programa de exercícios usando o Método Perfetti que nos permite melhorar os processos cognitivos e, portanto, ajudar na recuperação do desenvolvimento das atividades de vida diária de idosos com comprometimento cognitivo leve.

Palavras-chave: Disfunção Cognitiva; Terapia por Exercício; Cognição; Estado Funcional; Atividades Cotidianas.

INTRODUCTION

The cognitive decline of older adults is a syndrome that leads to a significant increase in social and economic costs, according to the United Nations report on global population aging. The report states that between 2015 and 2030, the population aged 60 years or older will increase by 56%, from 901 million to 1.4 billion, and that by 2050, the global population of older adults will be more than double the size it was in 2015, with approximately 2.1 billion people. In Latin America the expected growth rate of the older adult population over the next 15 years is 71%, which is the highest in the world, this highlights the importance of addressing this growing social problem. Older adults who do not receive early diagnosis and treatment for cognitive decline may progress from mild cognitive impairment to dementia and gradually lose their autonomy and ability to perform daily activities, which can also affect their social role and relationships with others. (Benavides-Caro, 2018).

By 2050, the World Health Organization (WHO) projects that the growth of the older adult population (over 60 years old) worldwide will increase from 12% to 22%, triggering one-fifth of the population to be in this age group, surpassing 2 billion people. The increase in life expectancy linked to the increase in the older adult population will imply a change in the epidemiological profile of this age group, characterized by an increase in the prevalence of multimorbidity, as well as an increase in the prevalence of cognitive impairment and associated pathologies such as Alzheimer's and dementia (Poblete, et al, 2019).

Older adults frequently present with chronic diseases, cognitive impairment, and depression. These last two have become part of the lives of many elderly people, and there are multiple anatomical and social reasons for them, such as variations in brain structure and functioning during old age, the culmination of their working life, and incapacity to perform some tasks that they used to execute without difficulty. All of this generates difficulties in relating to their environment (Prada, et al, 2022).

According to a study conducted by the National Institute of Statistics Censuses (INEC) in Ecuador in 2016, cognitive impairment occurs in 21.3% of people over 60 years old and 25.5% of older adults in the population (Censuses, 2016).

In the Cotopaxi Province, there are 2,292 older adults. The study was conducted in the Mulliquindil Parish, located in the Salcedo City. The study found that older adults in this area have social records of poverty, extreme poverty, and vulnerability, based on data provided by the Ministry of Economic and Social Inclusion, it was evident that there is a growing group of older adults who meet the parameters that lead to mild cognitive impairment, such as poverty and extreme poverty, low schooling, limited access to health services, abandonment, and feelings of loneliness. The study determined that cognitive impairment is very evident in this group of people due to the lack of importance given to its diagnosis and treatment. This has led them to abandon certain activities that they commonly performed and now no longer want or cannot do (Social, 2022).

Cognitive decline is becoming stronger in older adults, to the point that it can cause dementia if not treated in a timely and effective manner. This is why many people in this group lose their abilities to carry out activities of daily living, as well as their ability for personal or social relationships. It is important to prioritize cognitive decline as a concerning pathology that affects the growing older adult population (Russo., et al., 2020)

A topic that has not received enough attention, however, in recent years research has been focusing on innovative techniques and methods that are less harmful for cognitive treatment and have excellent results in improving the quality of life of older adults. By improving their cognitive processes such as concentration, memory, and learning, a notable improvement has been evidenced in the development of daily activities, as well as optimizing their performance in the social role. (Horta, 2018).

Among the various methods that have been used to treat cognitive decline in older adults are the Games and puzzles, Cognitive stimulation exercises, Physical exercise can have a positive impact on people with cognitive decline, Cognitive stimulation through textures, colors, dimensions, depth, height, also known as neurocognitive therapeutic exercise or Perfeti method, individual reminiscence therapy, occupational therapy (Albiol, et al., 2018).

The Perfetti Method, also known as Cognitive Therapeutic Exercise (CTE), was initially created for the rehabilitation of people with a stroke. It is a cognitive rehabilitation modality that aims to achieve motor functions using afferent information of a proprioceptive and/or tactile type. The method proposes recovering movement through the activation of cognitive processes such as perception, which results in a notable improvement in the movement of upper and lower extremities of the patient. Nowadays, it is being used for the treatment of different pathologies, and it has shown excellent cognitive results. The objective of implementing a program of exercises for mild cognitive impairment in older adults is to recover and improve cognitive processes and, therefore, help optimize and maintain the development of daily life activities in older adults (Castro W., Lopez Y., 2019).

The article by Sotomayor et al. (2022) discusses cognitive functioning in older adults, specifically the alterations in mental capacities such as memory, judgment, abstract reasoning, and concentration. These changes are important to identify as they can impact the autonomy and quality of life of patients.

The objective of this publication was to evaluate the cognitive functioning and degree of dependence in older adults at a geriatric center in the province of El Oro. The purpose of the evaluation was to put into practice strategies that guarantee active aging, with the application of the Barthel scale and SPMSQ of PFEIFFER to determine the dependence that presents in older adults due to aging and metabolic diseases. The results indicate that 76.6% of the participants were female and 23.4% were male. (Sotomayor et al., 2022)

The Barthel scale showed that 70.21% of individuals were independent, 14.89% had moderate dependence, 10.64% had slight dependence, 2.13% had severe dependence, and 2.13% had total dependence. (Sotomayor et al., 2022)

It is important to promote active and healthy aging through adaptation and coping with cognitive functioning in old age, through prevention and rehabilitation actions for the deterioration of mental functions of older adults that allow adequate cognitive functioning, through the combination of their health and quality of life. (González Martínez, 2021).

Castro S, (2018). Studied the correlation between healthy aging and cognitive decline, in which I exposed that in the fifties the population of Lima was made up of children, older adults (people aged 60 and over) represented only 5.7% of the population; however, by 2018 they represent 10.4%, in the same way, the world's population is aging, hence the importance of taking into account cognitive decline since without diagnosis and treatment it can lead to dementia, which translates into the progressive loss of cognitive abilities that compromise the functionality of people who suffer from it.

Horta M, (2018). They studied on the cognitive therapeutic exercise concept Perfetti. The study emphasizes the need for a correct physiotherapeutic treatment for patients affected by neurological pathologies, specifically hemiplegic patients. The authors showed some of the existing tools in the Cognitive Therapeutic Exercise that can illustrate physiotherapists and occupational therapists, providing them with a different way of working based on cognitive stimulation with excellent results and without greater harmful implications for the patients.

Cuvillo M, (2022). They made a systematic review of the effectiveness of cognitive multisensory rehabilitation (CMR) and cognitive therapeutic exercise (CTE) on the functionality and quality of life of adult, elderly, and pediatric patients compared to other interventions or no intervention. The review was conducted using randomized controlled clinical trials, pilot studies, and case series published between 2012 and 2021 in PubMed, PEDro, Cochrane Library, and CINHAL Complete. Ten studies met the eligibility criteria.The review found that CMR shows similar or superior benefits to other interventions on the functionality of the upper limb, gait, balance, and quality of life in neurological and trauma adult and pediatric patients.

METHODOLOGY

A This project of development is observational. The project evaluates elderly people to obtain the results of the progress after the application of an exercise program based on the Perfetti method. The study is longitudinal, with a prospective quantitative approach.

The research was conducted in Ecuador, specifically in the Cotopaxi Province, Salcedo Canton, in the rural parish of Mulliquindil, in the communities of Churoloma and San Francisco. The study involved elderly people who are part of the Mis años Dorados unit of the Envejeciendo Juntos project, which is a partnership with the Ministry of Economic and Social Inclusion (MIES). The population was selected from a total of 40 elderly people who use the service mentioned above, and the sample size was 20 elderly people who met the inclusion and exclusion criteria and also shared a diagnosis of mild cognitive impairment. (Ministerio, 2023).

Criteria of inclusion for the study are as follows: Elderly people aged 65 to 85 years old. Previously diagnosed with mild cognitive impairment. Previously evaluated with the Mini Mental test. Do not have pathologies that interfere with hand movement and touch.

Exclusion criteria: Older adults with proven visual impairment, with proven dementia, who do not have the ability to understand and obey orders

The instruments used were the Mini Mental test, which is a questionnaire that evaluates memory, orientation, concentration, and language to diagnose mild cognitive impairment. The test is based on scoring the patient's responses, which are then averaged and compared with standardized parameters in the test to determine the level of cognitive impairment. To be included in the population, older adults who scored 23 points or higher were considered. The Mini Mental test is the most commonly used cognitive screening test to evaluate symptoms compatible with cognitive impairment or

dementia (Llamuca et al., 2020).

The Mini Mental test was applied and certified by the psychologist in charge of the institution. It is worth mentioning that the validity and reliability of the test are given by the fact that all the items that make up the test showed good differentiation capacity. The test showed high internal consistency (α = 0.88) and good test-retest reliability (0.64-1.00; p <0.01) and inter-rater reliability (0.69-1.00; p <0.01), both for the total score and for each of the items (Buzzini et al., 2022).

The general information form was applied, which contained the participants' data such as names, surnames, years of schooling, demographic situation, social situation, associated and prevalent diseases. This form was certified by the group of professionals from the institution, composed of a physiotherapist and two psychologists.

The Barthel index was applied to evaluate functional capacity. This instrument evaluates a person's ability to perform activities of daily living, such as dressing, bathing, feeding, going to the bathroom, walking, climbing stairs, and controlling sphincters. It is of great use in rehabilitation due to its validity and reliability, ease of application and interpretation, and usefulness in monitoring patient progress. It assigns a score from 1 to 100 depending on the participant's functional capacity.

The text describes an intervention that was carried out over a period of four months to diagnose and treat mild cognitive impairment in older adults. The intervention involved several assessments and tests, including the Mini Mental test, that was previously described with a score of 23 out of 30 points, estimating mild cognitive impairment in older adults. The assessment took an estimated time of 40 minutes and was carried out through home visits. In the second week, a general information form was applied, which took an estimated time of 30 minutes using the same modality of home visits, in the third week, the Barthel index was applied to establish the degree of impairment in daily activities, with a score ranging from 85 to 90 out of 100, indicating mild dependence. The same modality was used, and the assessment took an estimated time of 30 minutes. In the fourth week, the information was processed, and with the population already defined, the exercise program based on the Perfetti method for mild cognitive impairment in older adults was applied. (Horta, 2018).

The exercise program began with first-grade exercises from the fifth to the tenth week through home visits. The duration was 45 minutes per session, during which exercises were performed for 10 minutes, followed by a 5-minute rest interval. The program was applied to 10 older adults on Mondays and Wednesdays and to another 10 older adults on Tuesdays and Thursdays to complete two weekly sessions (Córdova et al., 2023).

For the progression to second-grade exercises, we take the eleventh week up to the fourteenth week, using the same attention modality. To conclude, we take the last two weeks of intervention for the final evaluation with the Barthel index and the Mini Mental test (Buzzini et al., 2022).

For the intervention, the first-grade exercises were taken into account, which are according to their complexity and have the characteristic of the absence of voluntary movement. In general, they are based on recognition without visual control, elaboration, and verification of somesthetic receptive hypotheses. Then the patient must recognize the characteristics, dimension, spatiality, depth, and the exercise is carried out by the physiotherapist. The patient must pay attention and control the specific motor component. The muscles of the wrist and hand must be relaxed enough to allow perception in each of the exercises. Cognitive stimulation was carried out by presenting the materials with which they worked so that they could associate colors and sizes. Subsequently, the physiotherapist asked them to close their eyes and, far from guessing the answer, they had to try to make the correct selection. Then the physiotherapist took the patient's hand and guided the exercise, giving precise orders of the codes of each exercise, asking which code had been selected. At the end of each exercise, the successes and errors will be determined by checking the codes (Horta, 2018).

For the second-grade exercises, the older adult acquired sufficient automated control of stretching reactions through the correct performance of first-grade exercises. These exercises initiate the re-education of voluntary active mobility, and the intensity and speed of contraction depend on the person's ability (Horta, 2018).

The body segment we use is the upper and lower limbs, and with their movement, we will stimulate the somatosensory, kinesthetic, and tactile areas through cognitive operations of spatial nature related to the recognition of direction, distance, and shape. Contact operations related to the recognition of textures, pressure, resistance to reasoning, and weight (Horta, 2018).

Finally, the tabulation of the results obtained was carried out after the initial and final application of the Barthel index assessment instrument, using Excel for tabulation and IBM SPS Statistics 26 for data analysis. The results were expressed in tables, and the statistical T-student test was used. It was concluded that the statistical significance was p<0.05 (Pacheco., et al, 2020)

This research was carried out with the approval of the ethics committee for research on human beings of the Faculty of Health Sciences, Technical University of Ambato, under resolution 028-CEISH-UTA-2023, taking into account the respective ethical and gender considerations. After obtaining the approval and signature of the informed consent of the older adults,

they participated freely and voluntarily in the research. The ethical committee approved the study, and the participants provided their informed consent before participating in the research.

RESULTS

A population of 20 older adults was studied, of which 55% were male and the remaining 45% were female

The age ranges from 65 to 70 years, which corresponds to 45%, from 71 to 80 years, which corresponds to 40%, and from 81 to 85 years, which corresponds to 15%. The marital status of the population is 85% married, 5% widowed, and 10% single. 55% of the patients have an occupation of farmer, and 45% are housewives. 100% of the patients live in rural areas (Table 1).

Table 1. Sociodemographic characteristics of the investigated population

Sociodemographic characteristics		Frecuency	Percentage (%)
Age (Years)	65-70	9	45,0
	71-80	8	40,0
	81-85	3	15,0
Genre	Male	11	55,0
	Female	9	45,0
Marital Status	Married	17	85,0
	Widow	1	5,0
	Single	2	10,0
Occupation	Housewife	9	45,0
	Farmer	11	55,0
Residence	Rural	20	100,0
	Urban	0	0,0

Source: the authors.

After the application of the exercise program based on the Perfetti method for cognitive impairment, the results reflect in the initial evaluation by means of the Barthel Index, a "moderate dependence" level in 100% of the study population, which amounted to 20 people; While after the application of the program, in the final evaluation, an improvement in the performance of daily living activities was observed, showing a "moderate dependence" in 3 persons representing 15%, "low dependence" in 12 persons representing 60%, and finally independence in 5 persons representing 25%, which shows a considerable improvement in the functional capacity of older adults after the application of the exercises (Table 2).

Table 2. Comparison of functional capacity of older adults between measures

Dependence Level	initial evaluation		Final evaluation	
	Frecuency	Percentage (%)	Frecuency	Percentage (%)
Independence	0	0,0	5	25,00
Mild Dependence	0	0,0	12	60,00
Moderate Dependence	20	100,0	3	15,00
Severe Dependence	0	0,0	0	0,0
TotaL Dependence	0	0,0	0	0,0
Total	20	100,0	20	100,00

Source: the authors.

Regarding the cognitive function of the older adults, measured through the MiniMental, it was found that in the initial evaluation 100% of the population, which corresponded to 20 older adults, presented a state of deterioration; while after the application of the program 70% (n=14) of the older adults passed to a normal cognitive level and 30% (n=6) to a level of pathological suspicion, demonstrating an improvement in mental function after the exercises.

The Perfetti method was applied to facilitate cognitive processes in older adults and consequently to improve the performance of activities of daily living. Statistically significant differences were found between measures in functional capacity (p=0.000) through Student's t-test for paired tests (Table 3) and in cognitive function (p=0.000) through Wilcoxon rank test (Table 4). Which allows us to accept the alternative hypothesis and reject the null hypothesis, stating that Perfetti

exercises can improve the functional capacity of older adults.

Table 3. Paired samples t-test of functional ability

	Matched differences							
				95% confidence interval of the difference				
	Media	Standard deviation	Mean standard error	Inferior	Superior	t	gl	Sig. (bilateral)
Functional capacity (Barthel Index) Initial - Final	-1,100	0,641	0,143	-1,400	-0,800	-7,678	19	0,000

Source: the authors.

Table 4. Wilcoxon rank test for cognitive function

	Cognitive Function (Minimental) Initial - Final
Z	-4,012[c]
Sig. asintótica (bilateral)	,000

Source: the authors.

DISCUSSION

In this project, the sociodemographic data of the population under study were considered, as it is very important to understand why older adults have mild cognitive impairment. The study was conducted with a population of 20 older adults, of which 55% were male and 45% were female. The age range was between 65 to 70 years, which corresponds to 45%, 71 to 80 years, which corresponds to 40%, and 81 to 85 years, which corresponds to 15%. The marital status was 85% married, 5% widowed, and 10% single. 55% of patients are farmers and 45% are housewives. All patients live in rural areas, according to Toribio. J., et al (2018) in their study of computer-based cognitive rehabilitation in older adults. The study emphasizes that cognitive impairment is widely related to sociodemographic data, and that it is predominantly evident in females, contrary to our research which concluded that it is more prevalent in males. However, it is agreed that living in rural areas, having little education, occupation, age, and loneliness can worsen cognitive impairment until it reaches dementia, and consequently, the inability to perform activities of daily living. Therefore, appropriate and constant stimulation can produce favorable modifications in the structure and functioning of the brains of older adults. This highlights the importance of treating cognitive processes to enhance the development of daily activities.

One of the advantages that could be evidenced in computer-based cognitive treatment is that it was carried out in a more interactive and innovative way for older adults. On the other hand, the disadvantages are the lack of familiarity of these individuals with new technologies, the lack of knowledge of their use, functional deficits, and age-related restrictions.

Similarly, Perfetti is an innovative method in the treatment of cognitive impairment, whose advantage is its ease of use for working with older adults, whose sociodemographic data coincide with research conducted on the population with cognitive impairment, which predisposes them to the same. The physiotherapist is the main guide who will perform exercises whose complexity varies according to the use of each instrument presented to the patient, which will be different in terms of colors, two-dimensional sizes, textures, depth, height, and spatiality. Therefore, we can say that this method can create neurocognitive rehabilitation programs not only for older adults but also for any stage of life. In addition to supporting professionals in the field of evaluation and cognitive rehabilitation, the method demonstrated the maintenance of skills such as attention and executive function in most participants, as well as better cognitive performance in areas such as orientation, memory, perception, and rational operations, as well as in the execution of instrumental activities of daily living. (Horta, 2018).

while in the last evaluation, 3 individuals (15%) remained in "moderate dependence," 12 individuals (60%) were classified as having "slight dependence," and 5 individuals (25%) were classified as independent. This indicates a significant improvement in the study population. (Escobedo R., Fernandez N., 2023).

he Perfetti method is applied to facilitate cognitive processes and consequently improve the performance of activities of daily living. With a matched sample of the initial and final application of the Barthel Index, the bilateral significance of

0.000 was observed after the application of the method, compared to Gómez, I., et al (2020), who studied a cognitive stimulation program in mild cognitive impairment, a randomized controlled trial, with the aim of evaluating the impact of a cognitive stimulation program on cognitive function, activities of daily living (ADLs), anxiety and depression levels. A single-blind randomized controlled trial was conducted with 122 non-institutionalized elderly individuals with an MEC-35 score of 24-27. The intervention group (n = 54) received the intervention (10-week cognitive stimulation program) and was compared to a control group (n = 68) that did not receive intervention. Follow-up evaluations were conducted after the test and at 6 months after the test. The primary outcome was cognitive function determined by changes in scores on the Spanish version (MEC-35) of the Mini-Mental State Examination, while secondary outcomes were measured using the Barthel Index, the Lawton and Brody Scale, the Goldberg Questionnaire (anxiety subscale), and the Yesavage Geriatric Depression Scale (15-item version)

The article presents similarity in the application of the development project, in which we used the Perfetti method, since it talks about the application of an exercise program for cognitive stimulation, in which the same assessment instruments were taken into account for evaluation with the application of the Mini Mental test for the cognitive domain, and the Barthel Index for the assessment of activities of daily living. With respect to the results, similarity is seen in the improvement of cognitive status in older adults subjected to the intervention. The Barthel Index, on the other hand, did not show a significant improvement in activities of daily living in the last evaluation made in the article, but with the intervention carried out with the Perfetti method, improvement was shown in the ability to carry out activities of daily living in the last application of the Barthel Index.

CONCLUSION

It was possible to conclude that with the application of the exercise program based on the Perfetti method, it was possible to verify that the stated objective was achieved, since with the cognitive stimulation of older adults and after the pre- and post-test application of the Barthel Index, a notable improvement was evidenced in the development of the activities of daily living of the investigated individuals.

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