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Inspiratory Muscle Training in the elderly population: A review of the evidence on its benefits

Treinamento Muscular Inspiratório na população idosa: Uma revisão das evidências sobre os seus benefícios

Entrenamiento Muscular Inspiratorio en la población anciana: Una revisión de las evidencias sobre sus benefícios

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Abstract
The present study aimed to analyze, through a literature review, the scientific evidence regarding the benefits of inspiratory muscle training (IMT) in the elderly population. For this purpose, a search was carried out in the PubMed, PEDro, and SciELO databases, using descriptors related to the topic combined with Boolean operators, including articles published between 2020 and 2025, in Portuguese and English. Studies involving individuals aged 60 years or older were considered, including clinical trials and reviews, while duplicate or unavailable studies were excluded. At the end of the selection process, 17 studies were included for qualitative analysis. The results demonstrated that IMT promotes a significant increase in inspiratory muscle strength, mainly evidenced by improvements in maximal inspiratory pressure, in addition to contributing to reduced dyspnea, improved exercise tolerance, and, in some cases, enhanced functional capacity. It was also observed that the effects on pulmonary function were more modest in healthy elderly individuals, being more pronounced in those with respiratory impairments. Regarding quality of life, the studies indicated improvements mainly in physical aspects and general health perception. It is concluded that IMT represents a promising strategy in the context of aging, contributing to the maintenance of autonomy and quality of life, although further studies with greater methodological standardization are still needed to establish optimal protocols.
Keywords: Respiratory function; Elderly; Quality of life; Inspiratory muscle training.

Resumo
O presente estudo teve como objetivo analisar, por meio de uma revisão de literatura, as evidências científicas acerca dos benefícios do treinamento muscular inspiratório (TMI) na população idosa. Para isso, realizou-se uma busca nas bases de dados PubMed, PEDro e SciELO, utilizando descritores relacionados ao tema e combinados com operadores booleanos, incluindo artigos publicados entre 2020 e 2025, nos idiomas português e inglês. Foram considerados estudos com indivíduos com 60 anos ou mais, incluindo ensaios clínicos e revisões, sendo excluídos trabalhos duplicados ou indisponíveis. Ao final do processo de seleção, 17 estudos foram incluídos para análise qualitativa. Os resultados demonstraram que o TMI promove aumento significativo da força muscular inspiratória, evidenciado principalmente pela melhora da pressão inspiratória máxima, além de contribuir para a redução da dispneia, melhora da tolerância ao esforço e, em alguns casos, da capacidade funcional. Observou-se também que os efeitos sobre a função pulmonar foram mais modestos em idosos saudáveis, sendo mais expressivos em indivíduos com comprometimento respiratório. Em relação à qualidade de vida, os estudos apontaram melhorias principalmente nos aspectos físicos e na percepção geral de saúde. Conclui-se que o TMI representa uma estratégia promissora no contexto do envelhecimento, contribuindo para a manutenção da autonomia e qualidade de vida, embora ainda sejam necessários estudos com maior padronização metodológica para definição de protocolos ideais.
Palavras-chave: Função respiratória; Idosos; Qualidade de vida; Treinamento muscular inspiratório.

Resumen
El presente estudio tuvo como objetivo analizar, mediante una revisión de literatura, la evidencia científica acerca de los beneficios del entrenamiento muscular inspiratorio (TMI) en la población anciana. Para ello, se realizó una búsqueda

en las bases de datos PubMed, PEDro y SciELO, utilizando descriptores relacionados con el tema y combinados con operadores booleanos, incluyendo artículos publicados entre 2020 y 2025, en los idiomas portugués e inglés. Se consideraron estudios con individuos de 60 años o más, incluyendo ensayos clínicos y revisiones, excluyéndose trabajos duplicados o no disponibles. Al final del proceso de selección, se incluyeron 17 estudios para análisis cualitativo. Los resultados demostraron que el TMI promueve un aumento significativo de la fuerza muscular inspiratoria, evidenciado principalmente por la mejora de la presión inspiratoria máxima, además de contribuir a la reducción de la disnea, la mejora de la tolerancia al esfuerzo y, en algunos casos, de la capacidad funcional. También se observó que los efectos sobre la función pulmonar fueron más modestos en ancianos saludables, siendo más notables en individuos con afectación respiratoria. En relación con la calidad de vida, los estudios señalaron mejoras principalmente en los aspectos físicos y en la percepción general de la salud. Se concluye que el TMI representa una estrategia prometedora en el contexto del envejecimiento, contribuyendo al mantenimiento de la autonomía y la calidad de vida, aunque todavía son necesarios estudios con mayor estandarización metodológica para la definición de protocolos ideales.
Palabras clave: Función respiratória; Ancianos; Calidad de vida; Entrenamiento de los músculos inspiratorios.

1. Introduction

Population aging has emerged as a progressive global trend, and in Brazil this reality is also markedly evident. According to the most recent estimates from the Brazilian Institute of Geography and Statistics (IBGE), approximately 16.1% of the Brazilian population is aged 60 years or older, of whom 2.2% are 80 years or older, demonstrating the growth of the long-lived population, albeit permeated by pronounced regional and social inequalities expressed through intersectionality (IBGE, 2023; Cypreste, 2024). Projections by the United Nations reinforce this scenario, indicating a continuous increase in the older population over the coming decades, which poses challenges to public health and demands effective strategies to preserve functional capacity (United Nations, 2020).

With advancing age, the respiratory system undergoes significant morphofunctional changes that compromise its efficiency (Fonseca, 2010; Rivaldo & Spode, 2024). Among these changes are pulmonary parenchymal remodeling, increased oxidative stress in tissues, reduced lung compliance, deterioration of the ventilation–perfusion relationship, and a decline in respiratory muscle strength. Collectively, these factors contribute to the onset of dyspnea and reduced tolerance to physical exertion (Chow et al., 2021; Helan & Filipe, 2020).

In this context, the preservation of respiratory function is central to maintaining autonomy and functional independence in older adults. Evidence indicates that aging is associated with increased respiratory fatigue, higher ventilatory cost, and reduced ventilatory efficiency during physical activity, resulting in negative impacts on functional capacity. These changes, however, may be mitigated through specific interventions (Harms et al., 2023; Lima et al., 2025). Among these, inspiratory muscle training (IMT) stands out as a promising strategy, particularly due to its simplicity, low cost, and potential for high adherence.

This modality involves the application of controlled resistive loads to the inspiratory muscles, based on classical principles of physical training such as specificity, progressive overload, and individualization (Piñeiro-Carou et al., 2021; Vilaça et al., 2019). From a physiological perspective, the main effects associated with IMT include increased maximal inspiratory pressure (MIP), improved fatigue resistance, reduced dyspnea, and decreased competition for blood flow between ventilatory and peripheral muscles during physical exertion (Kocan et al., 2024).

Among the available devices, the most commonly used are pressure-threshold loading devices, such as the Threshold IMT and POWERbreathe, which allow individualized prescription based on percentages of MIP (Algamdi et al., 2023; Grabska et al., 2024). Intervention protocols described in the literature range from 4 to 12 weeks, with a frequency of 3 to 7 sessions per week and training intensities between 30% and 80% of MIP across samples with different health conditions (Kocan et al., 2024).

In light of population aging, the physiological changes in the respiratory system associated with aging, and the relevance of IMT for the general population, it is pertinent to investigate its potential benefits in older individuals. Therefore, the aim of this study was to analyze the scientific evidence available in the literature regarding the benefits of IMT in the elderly population.

2. Methodology

The present study consisted of an integrative literature review (Snyder, 2019), in a study with a quantitative approach in relation to the 17 (seventeen) articles selected to compose the corpus of this study and, with a qualitative approach in relation to the discussions (Risemberg et al., 2026; Pereira et al., 2018), employing a structured search strategy in scientific databases to gather and analyze available evidence on the benefits of inspiratory muscle training (IMT) in the elderly population.

For the development of the search strategy, descriptors registered in the Health Sciences Descriptors (DeCS) and their corresponding terms in the Medical Subject Headings (MeSH) were used. The search terms included "inspiratory muscle training," "elderly," "pulmonary function," "quality of life," and "respiratory muscle strength." These descriptors were combined using the Boolean operators AND and OR to enhance the precision and sensitivity of the searches.

Eligible studies included articles published between 2020 and 2025, in Portuguese and English, that targeted individuals aged 60 years or older and addressed IMT either as a standalone intervention or in combination with other approaches. Randomized controlled trials, systematic reviews, and integrative reviews that met these criteria were included. Duplicate articles or those with unavailable full-text access were excluded.

The study selection process was conducted in stages. Initially, articles were screened through the reading of titles and abstracts to identify potentially eligible studies. In the subsequent stage, the selected studies were assessed in full text, allowing for a thorough evaluation of their compliance with the inclusion criteria. Finally, data extraction and synthesis were performed, encompassing methodological characteristics, IMT protocols employed, including frequency, intensity, duration, and types of devices, as well as the main outcomes investigated, such as inspiratory muscle strength and endurance, pulmonary function, functional capacity, and quality of life.

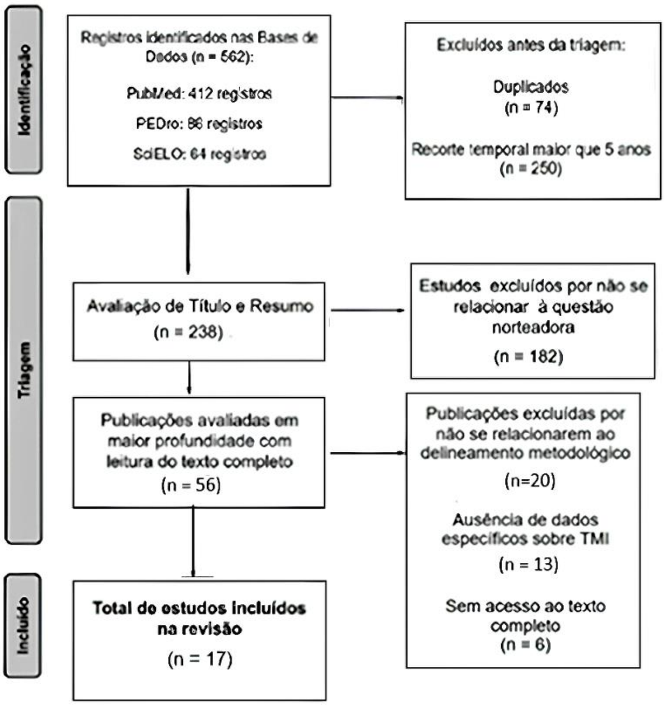
3. Results

The search strategy initially identified 312 potentially eligible records across the consulted databases. After applying the predefined time frame and removing duplicates, 238 articles remained for the title and abstract screening stage. At this stage, 182 studies were excluded for not meeting the eligibility criteria, for not using inspiratory muscle training (IMT) as the primary intervention, for not assessing outcomes related to respiratory function or quality of life, or for not including a sample composed of older adults.

Thus, 56 articles were selected for full-text review. Following this stage, 39 studies were excluded for the following reasons: methodological design not meeting the selection criteria (n = 20), absence of specific data on IMT (n = 13), and unavailability of full text (n = 6).

At the end of the process, 17 studies fully met the inclusion criteria and were incorporated into the qualitative synthesis of this review. The study selection process is presented in the flowchart below (Figure 1).

Figure 1 - Stages of the study selection process according to the PRISMA protocol.



Source: Research data (2026).

Next, Table 1 presents the list of the 17 authors and articles selected to comprise the corpus of this study.

Table 1 presents a detailed extraction of data from the included studies, encompassing the most relevant variables to address the proposed objective.

Author (Year)	Study design	Sample	Device	Intensity, Frequency, and Duration	Main Findings
Xie et al. (2025)	Systematic review	14 older adults with COPD aged ≥60 years	Threshold + RP	Protocols ranging from 30–60% MIP; 20–30 min/day	Increase in MIP and improvement in functional capacity in older adults, especially when associated with pulmonary rehabilitation; limited effects on pulmonary function.
Silva et al. (2025)	Randomized controlled trial	24 healthy older adults aged ≥60 years	PowerBreathe	40% MIP; 30 breaths; 2 sets/day; 4 weeks	Increase in diaphragmatic thickness and improvement in aerobic capacity.
Kaya et al. (2025)	Randomized controlled trial	40 older women aged ≥60 years	Threshold IMT	30% MIP with progression; 5×/week; 8 weeks	Improvement in diaphragmatic thickness and respiratory muscle strength.
Correia et al. (2025)	Systematic review and meta-analysis	Older adults	-	Varied IMT protocols associated with physical exercise	Improvements in respiratory function and functional capacity.
Arruda et al. (2025)	Pilot randomized controlled trial	40 post-COVID older adults aged ≥65 years	Threshold	30–50% MIP; 5×/week; 6 weeks	IMT promoted a significant increase in MIP and improved exercise tolerance, with a positive impact on functional capacity.
Mello et al. (2024)	Systematic review	18 healthy older adults aged ≥60 years	Threshold c	30% a 60% PImax com progressão gradual; 5-7x/sem, 6-12 sem.	Increase in inspiratory muscle strength; additional positive effects depend on intensity, duration, and combination with other interventions.

Martín-Sánchez et al. (2023)	Randomized controlled trial	32 older women aged 70 to 85 years	Threshold IMT	30–50% MIP; 2×/day; 6 days/week; 8 weeks	Significant increase in inspiratory muscle strength and maintenance of gains after 6 months.
Cardoso-Alves et al. (2023)	Clinical trial	28 older adults aged ≥72 years	PowerBreathe	40% PImax; 5 dias/sem; 8 sem	Improvements in functional capacity and quality of life.
Borel et al. (2022)	Randomized controlled trial	36 healthy older adults aged 70 ± 5 years	PowerBreathe	40% MIP with progression; 6 weeks.	Significant improvement in inspiratory muscle strength and functional capacity.
Martín-Sánchez et al. (2022)	Double-blind randomized controlled trialECR duplo-cego	34 institutionalized older women aged 78 ± 6 years.	Threshold	High vs low load, 5×/week, 8 weeks	Promoted a significant increase in MIP and improved functional capacity following a long-term intervention.
Martín-Sánchez et al. (2021)	Clinical trial	34 older adults aged ≥70 years	Threshold IMT	30% MIP; 2 sessions/day; 8 weeks	Gains in inspiratory muscle strength and improvement in mobility.
Cardoso-Alves et al. (2021)	RCT	40 institutionalized older adults aged ≥65 years.	Flow-oriented incentive spirometer	Progressive; 5×/week; 6 weeks	Significant increase in MIP and improvement in health-related quality of life.
Manifield et al. (2021)	Systematic review and meta-analysis	22 healthy older adults aged ≥60 years.	Threshold / resistive	30–80% MIP; 5–7×/week; 4–12 weeks	Significant increase in MIP; inconsistent effects on functional capacity, pulmonary function, and quality of life.
Severin et al. (2021)	Clinical trial	30 older adults (mean age ≈70 years) undergoing pulmonary rehabilitation	Threshold IMT	40% MIP; 2 sessions/day; 5 days/week; 8 weeks	Significant reduction in dyspnea and improvement in exercise tolerance.
Severin et al. (2020)	Clinical trial	26 older adults aged ≥60 years	Threshold IMT	30% MIP; 2 sessions/day; 6 weeks	Improvements in functional capacity and reduction in dyspnea.
Seixas et al. (2020)	Systematic review	13 healthy older adults aged ≥60 years.	Threshold	40–60% MIP; 5–7×/week; 6–8 weeks.	Promoted an increase in inspiratory muscle strength and improved ventilatory efficiency, with variable effects on lung volumes.
Langer et al. (2020)	Clinical trial	32 older adults aged ≥70 years	Threshold IMT	30–60% MIP; 5 days/week; 8 weeks	Reduction in dyspnea and increased exercise tolerance.

Legend: IMT: Inspiratory Muscle Training; MIP: Maximal Inspiratory Pressure; RCT: Randomized Controlled Trial; COPD: Chronic Obstructive Pulmonary Disease; PR: Pulmonary Rehabilitation; x/week: times per week; weeks: weeks; min: minutes.
Source: Research data (2026).

Of the 17 included studies, 9 were randomized controlled trials, 6 were systematic reviews, and 2 were integrative reviews. The investigated population included healthy older adults, both institutionalized and non-institutionalized, as well as individuals with specific clinical conditions, such as chronic obstructive pulmonary disease (COPD), post-COVID-19 syndrome, and age-related functional decline.

4. Discussion

The present literature review analyzed recent scientific evidence regarding the effects of inspiratory muscle training (IMT) in the elderly population. Overall, the findings indicate that IMT constitutes an effective intervention for increasing respiratory muscle strength, with positive impacts on functional capacity, pulmonary function, and quality of life. However, the magnitude of these effects varies according to individuals' clinical profiles and the characteristics of the implemented protocols.

4.1 Inspiratory Muscle Training Protocols

A considerable heterogeneity was observed in the IMT protocols used across the included studies, particularly regarding training intensity, weekly frequency, session duration, and total intervention period. This methodological variability is widely reported in the literature and partially reflects the absence of a definitive consensus on the optimal IMT protocol for the elderly population, which exhibits broad functional, clinical, and physiological diversity (Manifield et al., 2021; Mello et al., 2024).

Despite this heterogeneity, a predominant pattern was identified regarding the type of device used. Most studies employed linear loading devices, particularly those providing constant and adjustable inspiratory resistance, such as the Threshold® IMT and PowerBreathe®. These devices are widely recommended in the literature because they allow precise control of the applied load, thereby facilitating progressive overload and protocol reproducibility, in addition to demonstrating good adherence and safety in older adults (Mello et al., 2024; Severin et al., 2021).

Regarding training intensity, most studies initiated IMT at loads corresponding to 30% to 60% of maximal inspiratory pressure (MIP), with gradual progression throughout the intervention period. This strategy is consistent with the principles of resistance training, which indicate that moderate to high intensities are required to induce meaningful physiological adaptations, particularly in respiratory muscles that undergo functional decline with aging (Martín-Sánchez et al., 2023; Kaya et al., 2025).

Studies using initial intensities below 30% of MIP tended to report more modest gains, whereas those reaching or exceeding 60% of MIP demonstrated more pronounced increases in inspiratory muscle strength, provided that the tolerance limits of the elderly population were respected (Mello et al., 2024; Xie et al., 2025).

Regarding weekly frequency, a predominance of protocols involving 5 to 7 sessions per week was observed (Kaya et al., 2025; Arruda et al., 2025; Mello et al., 2024), indicating an almost daily training approach. This high frequency is justified by the high adaptive capacity of the inspiratory musculature and the need for continuous stimulus to maintain and progress gains, particularly in older individuals, in whom training reversibility may occur more rapidly (Kaya et al., 2025; Manifield et al., 2021). Session duration ranged, on average, from 20 to 30 minutes, generally distributed into two daily sets, a strategy aimed at reducing excessive fatigue and improving adherence to the program.

The total intervention period varied between 6 and 12 weeks, with studies lasting 8 weeks or longer demonstrating more consistent results, particularly for outcomes related to functional capacity and quality of life. This finding supports previous evidence indicating that more robust structural and functional adaptations of the respiratory musculature, as well as their transfer to functional activities and subjective well-being, require longer training periods (Borel et al., 2022; Mello et al., 2024; Xie et al., 2025).

Additionally, recent literature suggests that longer-duration protocols with systematic load progression tend to enhance not only inspiratory strength gains but also their indirect effects on exercise tolerance, dyspnea reduction, and improved functional autonomy in older adults, especially when IMT is combined with pulmonary rehabilitation programs or global exercise training (Severin et al., 2021; Xie et al., 2025).

4.2 Inspiratory muscle strength and physiological adaptations

Improvement in MIP was the most consistent and robust outcome among the studies included in this review, being repeatedly observed in both randomized controlled trials and recent systematic reviews. Overall, IMT programs promoted statistically significant increases in inspiratory muscle strength, regardless of baseline functional level, sex, or clinical condition of the older adults evaluated (Manifield et al., 2021; Mello et al., 2024; Xie et al., 2025). These findings corroborate contemporary literature by demonstrating that, despite structural and functional changes inherent to aging, the respiratory musculature retains a substantial capacity to adapt to overload training stimuli.

From the perspective of physiological aging, the progressive decline in respiratory muscle strength and endurance is associated with sarcopenia, reduced thoracic compliance, and neuromuscular alterations that impair ventilatory efficiency. However, the observed results indicate that IMT is capable of attenuating or partially reversing these effects, challenging the assumption that aging irreversibly limits the response to specific muscle training (Kaya et al., 2025; Mello et al., 2024).

From a physiological standpoint, MIP gains induced by IMT are attributed to a combination of peripheral and central adaptations. Peripheral adaptations include improved contractile efficiency of the diaphragm and accessory inspiratory muscles, associated with selective muscle fiber hypertrophy, improved length–tension relationship, and increased resistance to respiratory muscle fatigue (Seixas et al., 2020; Mello et al., 2024). In parallel, neural adaptations play a relevant role, enhancing motor unit recruitment, motor unit synchronization, and intermuscular coordination during inspiratory effort, resulting in greater capacity to generate negative pressure during maximal inspiration (Martín-Sánchez et al., 2022; Borel et al., 2022).

Additional evidence from imaging-based studies, such as diaphragmatic ultrasonography, indicates increases in diaphragmatic thickness and mobility following IMT programs in older adults. These structural adaptations are associated with improved ventilatory mechanics and reduced perception of respiratory effort, contributing to greater tolerance of activities of daily living and reduced impact of functional dyspnea (Cardoso-Alves et al., 2023; Severin et al., 2021). Although not all studies directly assessed these morphofunctional variables, indirect findings related to reduced respiratory fatigue support the relevance of these adaptations.

Furthermore, recent reviews highlight that inspiratory muscle strength gains tend to be more consistent when IMT is performed at moderate to high intensities with systematic load progression, following the principles of exercise training. Protocols reaching or exceeding 60% of MIP demonstrate greater strength improvements, provided they are individually tailored and properly monitored, particularly in older populations (Manifield et al., 2021; Mello et al., 2024; Xie et al., 2025).

Taken together, these findings reinforce the role of IMT as an effective intervention for strengthening inspiratory muscles in older adults, supported by a solid physiological basis and with potential to mitigate the effects of respiratory aging. The consistency of MIP gains observed in the literature supports its use as a primary outcome in future studies and as a relevant component in programs aimed at promoting functionality and autonomy in the elderly population.

4.3 Impact on functional capacity

Although the increase in inspiratory muscle strength represents the most consistent outcome of inspiratory muscle training (IMT), the effects of this intervention on overall functional capacity in older adults showed greater variability across the included studies. Some clinical trials and systematic reviews demonstrated significant improvement in functional outcomes, such as increased distance covered in the six-minute walk test (6MWT) and improved performance in functional mobility tests, while others did not identify statistically significant changes after the intervention period (Manifield et al., 2021; Borel et al., 2022).

This heterogeneity of results can largely be explained by the multifactorial nature of functional capacity in older individuals. Functional performance depends on the integration of the respiratory, cardiovascular, musculoskeletal, and neurological systems, and is also influenced by factors such as prior physical activity level, presence of comorbidities, nutritional status, and psychosocial aspects. Therefore, isolated strengthening of the inspiratory muscles, although relevant, may not be sufficient to promote substantial functional gains in all clinical and functional contexts (Manifield et al., 2021; Severin et al., 2021).

Nevertheless, recent evidence indicates that IMT may exert an indirect positive effect on functional capacity, particularly through reducing the sensation of dyspnea and the ventilatory cost during physical exertion. By improving inspiratory muscle efficiency, IMT reduces the relative ventilatory demand during submaximal activities, promoting greater exercise tolerance and delaying the onset of respiratory fatigue (Martín-Sánchez et al., 2022; Mello et al., 2024). This mechanism is especially relevant in older adults with limited functional reserve, in whom small improvements in ventilatory efficiency may result in clinically meaningful functional impact.

Furthermore, studies that combined IMT with pulmonary rehabilitation programs or global physical exercise interventions demonstrated more consistent results in functional outcomes, suggesting a synergistic effect between respiratory muscle strengthening and training of the cardiovascular and musculoskeletal systems (Severin et al., 2021; Xie et al., 2025). These findings reinforce the importance of integrated approaches to promote functionality in older adults, in which IMT acts as a complementary component that enhances functional gains.

4.4 Pulmonary function

Regarding pulmonary function, the included studies generally demonstrated modest effects of IMT on classical spirometric parameters, such as forced expiratory volume in the first second (FEV_1) and forced vital capacity (FVC), especially in populations of healthy older adults. Most clinical trials did not observe clinically relevant changes in these outcomes after isolated IMT interventions, which is consistent with findings from recent systematic reviews (Seixas et al., 2020; Manifield et al., 2021).

In contrast, in populations of older adults with pre-existing respiratory impairment, such as those with chronic obstructive pulmonary disease (COPD) or post-infectious respiratory conditions, the effects of IMT on pulmonary function were more evident. Studies included in this review reported statistically significant improvements in spirometric parameters and ventilatory efficiency, particularly when IMT was combined with structured pulmonary rehabilitation programs (Seixas et al., 2020; Xie et al., 2025).

These results indicate that the main mechanism of action of IMT is not directly related to increasing lung volumes or reversing structural changes in the pulmonary parenchyma, but rather to improving the efficiency of the respiratory muscles. By strengthening the inspiratory muscles, IMT reduces the work of breathing and optimizes the relationship between ventilation and metabolic demand, resulting in more effective ventilation and reduced ventilatory overload during physical exertion (Arruda et al., 2025; Mello et al., 2024).

From a clinical perspective, these findings suggest that the impact of IMT on pulmonary function should be interpreted in a contextualized manner, considering the baseline status of the respiratory system. In older adults without established pulmonary disease, the benefits of IMT tend to manifest mainly in functional and perceptual outcomes, such as reduced dyspnea and improved exercise tolerance. In contrast, in older adults with respiratory impairment, IMT may contribute more directly to improvements in pulmonary function and ventilatory efficiency, reinforcing its role as an adjunct intervention in rehabilitation programs (Xie et al., 2025).

4.5 Quality of life and psychosocial aspects

Quality of life was assessed in some of the included studies using validated and widely used instruments in older populations, such as the Short Form Health Survey (SF-36) and the World Health Organization Quality of Life – BREF (WHOQOL-BREF). Overall, the results indicated more pronounced improvements in domains related to functional capacity,

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vitality, general health perception, and physical aspects, whereas emotional and social domains showed more heterogeneous responses (Cardoso-Alves et al., 2021; Mello et al., 2024).

These findings suggest that the benefits of inspiratory muscle training (IMT) extend beyond purely physiological effects, positively impacting functional autonomy and overall well-being in older adults. Improvements in inspiratory muscle strength and ventilatory efficiency tend to reduce the perception of effort during daily activities, which may enhance perceived physical capacity and, consequently, positively influence self-rated health (Manifield et al., 2021).

More recent studies also indicate that IMT may have a relevant impact on psychosocial aspects, such as reduced perceived fatigue, increased self-confidence in performing physical activities, and greater engagement in rehabilitation or supervised exercise programs (Mello et al., 2024; Severin et al., 2021). The reduction of dyspnea during exertion appears to play a central role in this process by decreasing fear associated with physical activity and promoting more active behavior, especially in previously sedentary older adults or those with a history of respiratory limitations.

From a critical perspective, it is observed that not all included studies evaluated quality of life as a primary outcome, which may explain the variability in the results found. In addition, generic instruments such as the SF-36 and WHOQOL-BREF, although validated, may not sensitively capture specific changes related to respiratory function, suggesting the need for the combined use of more targeted instruments in future investigations.

Therefore, the impact of IMT on quality of life is considered clinically relevant, although dependent on the magnitude of functional gains and the context in which the intervention is applied. Isolated IMT interventions may promote noticeable improvements in vitality and health perception, but their effects tend to be enhanced when integrated into multidimensional rehabilitation programs that simultaneously address physical, emotional, and social aspects of aging.

4.6 Additional systemic effects of IMT

Emerging evidence in the literature indicates that IMT may promote relevant systemic adaptations, extending its impact beyond the respiratory musculature. Recent studies point to improvements in cardiovascular autonomic control, characterized by increased vagal modulation, better sympathovagal balance, and reduced blood pressure response during physical exertion, especially in older adults with functional impairment or associated chronic conditions (Silva et al., 2025; Mello et al., 2024).

These autonomic adaptations are clinically relevant, since aging is associated with a greater predominance of sympathetic activity and reduced heart rate variability, factors linked to increased cardiovascular risk. Strengthening the inspiratory muscles may reduce the respiratory metaboreflex, decreasing peripheral vasoconstriction during exertion and promoting a more efficient cardiovascular response (Kaya et al., 2025; Mello et al., 2024; Martín-Sánchez et al., 2023).

In addition, there is evidence suggesting that IMT may positively impact postural balance and functional stability, which are essential aspects for fall prevention in older adults. Improvements in respiratory coordination and trunk control, combined with reduced respiratory fatigue, may contribute to greater stability during functional activities, although this mechanism is not yet fully elucidated (Severin et al., 2021; Mello et al., 2024).

Despite the growing interest in these systemic effects, it is observed that most available studies have small sample sizes and short follow-up durations, which limits the generalization of the findings. Moreover, many of these outcomes were assessed as secondary endpoints, reinforcing the need for future investigations with specific study designs to explore these adaptations more robustly.

Thus, the systemic effects of IMT are considered one of the most promising perspectives of this intervention in the older population. However, these benefits should be interpreted with caution until more consistent evidence becomes available.

Even so, current data support the concept of IMT as an integrated intervention, with the potential to contribute not only to respiratory function but also to the overall, functional, and cardiovascular health of older adults, especially when incorporated into multidimensional care programs.

5. Conclusion

This literature review demonstrated that IMT is an effective, safe, and low-cost intervention for the older population, with consistent benefits, particularly in increasing inspiratory muscle strength, as represented by maximal inspiratory pressure (MIP). The results showed that respiratory muscles retain a significant capacity for adaptation to training, even in the presence of physiological changes associated with aging.

In addition, positive effects were observed on functional capacity, exercise tolerance, and reduction of dyspnea, although these outcomes showed greater variability due to the multifactorial nature of functionality in older adults. Regarding pulmonary function, the impacts were more modest in healthy individuals and more evident in older adults with respiratory impairment, especially when IMT was combined with pulmonary rehabilitation programs.

Quality of life was also positively influenced, particularly in physical domains and general health perception, reinforcing the potential of IMT to promote greater autonomy and well-being in this population. Furthermore, emerging evidence suggests possible systemic effects, including benefits in cardiovascular autonomic control and broader functional aspects.

However, the heterogeneity of protocols and evaluation methods across studies limits the standardization of more precise clinical recommendations. Therefore, there is a need for future research with greater methodological rigor, representative samples, and long-term follow-up in order to establish more consistent guidelines for the application of IMT in clinical practice.

In conclusion, IMT represents a promising therapeutic strategy in the context of aging and should be considered as an integral part of multidimensional approaches aimed at maintaining functionality, independence, and quality of life in the older population.

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