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Non-Surgical Management of Presbyopia: Optical Correction, Pharmacological Therapies, Phytotherapy, Nutritional Supplementation, and Complementary Approaches - A Narrative Review

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Abstract

Background: Presbyopia is an age-related decline in accommodative function that progressively impairs near vision. Although optical correction remains the conventional treatment, pharmacological and non-pharmacological alternatives have attracted increasing interest. This review examines the clinical evidence supporting non-surgical interventions, including conventional treatments, phytotherapy, nutritional supplementation, and complementary approaches.

Methods: A narrative review of published clinical investigations, ophthalmological literature, and regulatory documents was conducted, focusing on non-surgical interventions for presbyopia. Randomized trials, comparative clinical studies, and relevant clinical evidence concerning established optical correction were considered. Studies evaluating visual fatigue or accommodative dysfunction without a clearly defined presbyopic population were analyzed separately as indirect evidence. Surgical procedures and interventions supported exclusively by preclinical findings were excluded.

Results: Spectacles and contact lenses provide established optical correction of near vision. Topical miotic agents, including pilocarpine, aceclidine, and carbachol combined with brimonidine, demonstrated clinically meaningful improvements in near visual acuity in randomized trials. In GEMINI 1, pilocarpine 1.25% produced a three-line or greater improvement in near visual acuity in 30.7% of participants compared with 8.1% receiving vehicle. In pooled NEAR trials, pilocarpine 0.4% achieved the corresponding primary endpoint in 40.1% versus 19.1% of participants. Clinical studies of herbal formulations containing *Cassia Semen*, wolfberry, and *Dendrobium huoshanense*, as well as *Cassia tea*, reported improvements in near visual performance or subjectively measured accommodative amplitude. Antioxidant supplementation demonstrated modest improvements in accommodative measurements in selected adults, although the evidence was frequently derived from populations with visual fatigue rather than established presbyopia. Visual exercises did not demonstrate objective improvement in near visual acuity or accommodative amplitude in a presbyopia-specific clinical investigation.

Conclusions: Optical correction and approved topical miotic agents provide established non-surgical options for improving near vision in presbyopia. Phytotherapeutic and nutritional interventions have produced favorable findings in selected clinical studies, but their efficacy, reproducibility, and long-term safety remain insufficiently established. Current evidence does not demonstrate that these interventions restore the physiological accommodation lost through age-related crystalline lens stiffening.

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1. Introduction

Presbyopia is a progressive, age-related reduction in the ability of the eye to focus on near objects, resulting primarily from changes in the biomechanical properties of the crystalline lens. Although the ciliary muscle, zonular apparatus, and lens capsule participate in accommodation, progressive lens stiffening is considered a major contributor to the age-related loss of accommodative amplitude. Presbyopia generally becomes symptomatic during the fourth or fifth decade of life, when the

residual accommodative capacity becomes insufficient for comfortable reading and other near-vision activities ^[1].

The clinical manifestations of presbyopia include difficulty reading small print, the need to hold reading material farther away, reduced visual comfort during prolonged near tasks, and increasing dependence on positive optical correction. The severity of symptoms depends on age, refractive status, residual accommodative function, working distance, illumination, and individual visual demands ^[1].

Presbyopia represents a substantial global public health problem. Fricke *et al.* estimated that approximately 1.8 billion individuals worldwide had presbyopia in 2015, corresponding to approximately one-quarter of the global population. Among them, approximately 826 million experienced near-vision impairment because of absent or inadequate correction ^[2]. These figures emphasize the importance of accessible and effective non-surgical management.

Conventional treatment relies on reading spectacles, bifocal or progressive addition lenses, multifocal contact lenses, and monovision correction. These approaches compensate for insufficient accommodation through optical modification, providing functional improvement without restoring the original biomechanical properties of the crystalline lens ^[1].

Several surgical approaches have been developed, including corneal laser procedures, refractive lens exchange, implantation of multifocal or extended-depth-of-focus intraocular lenses, and other corneal or lens-based interventions. Although these procedures may improve near and intermediate vision, they involve procedure-specific risks and may cause optical disturbances, including glare, halos, and reduced contrast sensitivity. Moreover, most surgical strategies compensate for accommodative loss rather than restoring the physiological accommodation of the youthful crystalline lens ^[1].

Consequently, increasing attention has been directed toward non-surgical alternatives capable of improving near vision while avoiding invasive procedures. Topical pharmacological agents represent a major advance in this field. Pilocarpine, aceclidine, and carbachol combined with brimonidine improve near visual acuity predominantly through pupillary constriction and increased depth of focus. Randomized clinical trials have demonstrated clinically meaningful improvements in near vision, supporting regulatory approval of specific formulations ^[3–6].

In parallel, phytotherapeutic and nutritional interventions have attracted interest because oxidative stress and age-related biochemical changes may contribute to alterations in crystalline lens proteins. Clinical investigations have evaluated herbal formulations containing Cassiae Semen, wolfberry, and Dendrobium huoshanense, Cassiae tea, and combinations of antioxidant compounds. Some studies have reported improvements in near visual acuity or measured accommodative function, although their mechanisms and long-term clinical relevance remain uncertain ^[7–10].

Complementary interventions, including visual exercises and other non-pharmacological techniques, have also been proposed as potential approaches to improving near visual performance. However, improvements in subjective visual comfort must be distinguished from objective recovery of accommodative function ^[11].

Despite the growing range of available interventions, substantial differences exist in their mechanisms of action, clinical efficacy, safety, and quality of supporting evidence.

In particular, improved near visual acuity does not necessarily indicate restoration of physiological accommodation.

The aim of this narrative review is to critically examine the clinical evidence supporting non-surgical management of presbyopia, including optical correction, conventional pharmacological therapies, phytotherapy, nutritional supplementation, antioxidant interventions, and complementary approaches. Particular attention is given to clinical efficacy, safety, methodological limitations, and the distinction between optical compensation and restoration of accommodative function.

2. Methods

2.1. Review Design

This study was designed as a narrative review of the clinical literature concerning non-surgical management of presbyopia.

The review focused on interventions associated with favorable clinical findings in humans, while also considering relevant negative studies when necessary to interpret the evidence concerning visual exercises and complementary treatments.

Because of substantial heterogeneity in intervention mechanisms, study populations, outcome definitions, and treatment duration, a quantitative meta-analysis was not undertaken.

2.2. Literature Identification

Relevant publications were identified through targeted searches of PubMed/MEDLINE, publicly accessible journal databases, reference lists of relevant publications, and regulatory documentation available through September 2026. Search terms included combinations of presbyopia, accommodation, near visual acuity, optical correction, reading spectacles, multifocal contact lenses, pilocarpine, aceclidine, carbachol, brimonidine, herbal medicine, phytotherapy, antioxidant supplementation, Cassiae Semen, wolfberry, Dendrobium, lutein, astaxanthin, anthocyanins, acupuncture, and visual exercises.

The searches were supplemented by examination of relevant clinical trials and prescribing information for approved pharmacological formulations.

The literature identification was targeted rather than exhaustive. Accordingly, no PRISMA flow diagram or claim of systematic study identification was made.

2.3. Eligibility Criteria

Clinical studies were considered relevant when they evaluated non-surgical interventions and reported at least one visual or accommodative outcome.

The principal outcomes of interest were near visual acuity, distance-corrected near visual acuity, accommodative amplitude, near-point performance, reading ability, and functional visual improvement.

Studies involving participants with established presbyopia were considered direct evidence.

Studies involving adults with visual fatigue or accommodative dysfunction, without a clearly defined presbyopic population, were considered indirect evidence and analyzed separately.

Surgical procedures, exclusively preclinical investigations, and interventions without demonstrated favorable clinical findings were excluded from the principal treatment tables.

2.4. Data Extraction

For each clinical study, the following information was extracted when available: study design, population, sample size, intervention, dose, treatment duration, principal efficacy outcomes, adverse events, and methodological limitations.

Data not adequately reported in the accessible publication or regulatory documentation were designated as not reported rather than interpreted as absence of adverse events or absence of treatment effect.

2.5. Critical Appraisal

Methodological limitations were evaluated descriptively, considering randomization, allocation concealment, masking, outcome measurement, missing data, selective reporting, sample size, and applicability to patients with established presbyopia.

Particular attention was given to the distinction between subjective and objective accommodation measurements, because pupillary constriction and increased depth of focus may improve near-point performance without restoring crystalline lens flexibility.

A complete outcome-specific Cochrane RoB 2 assessment was not performed; therefore, formal risk-of-bias classifications were not assigned.

2.6. Evidence Synthesis

The evidence was organized into four principal treatment categories: optical correction, conventional pharmacological treatment, phytotherapy, and nutritional or antioxidant

supplementation.

Visual exercises and complementary interventions were discussed separately when the available clinical findings did not establish efficacy for presbyopia.

3. Results

3.1. Optical Correction

Optical correction remains an established non-surgical approach to presbyopia management. The principal modalities include single-vision reading spectacles, bifocal and progressive addition lenses, occupational spectacles, multifocal contact lenses, and monovision contact lens correction.

Single-vision reading spectacles provide positive optical power at a predetermined working distance. Bifocal and progressive lenses permit correction at multiple distances, whereas occupational lenses are designed primarily for intermediate and near visual tasks.

Multifocal contact lenses provide simultaneous optical correction for different viewing distances. Monovision correction uses different refractive targets for the two eyes, typically favoring distance vision in one eye and near vision in the other.

These interventions improve functional near vision but do not modify the underlying age-related changes in the crystalline lens. Their selection depends on refractive status, visual demands, binocular function, and individual tolerance ^[1].

The principal optical interventions are summarized in Table 1.

Table 1: Optical correction strategies for presbyopia.

Intervention	Mechanism	Demonstrated clinical benefit	Limitations
Single-vision reading spectacles	Positive optical power compensates for accommodative loss.	Improve near visual acuity at a prescribed working distance.	Require removal or replacement for distance vision.
Bifocal spectacles	Separate optical zones provide distance and near correction.	Improve vision at two prescribed distances.	Limited intermediate vision and possible image jump.
Progressive addition lenses	Gradual variation in optical power provides correction across multiple distances.	Improve distance, intermediate, and near vision.	Peripheral distortion and adaptation difficulties.
Occupational spectacles	Optical correction optimized for near and intermediate distances.	Improve functional vision during reading and computer-related activities.	Limited suitability for distance activities.
Multifocal contact lenses	Simultaneous optical correction using multiple refractive zones.	Improve near vision and reduce dependence on reading spectacles.	Possible contrast reduction, halos, and adaptation difficulties.
Monovision contact lenses	Differential correction of the two eyes for distance and near vision.	Improve functional near vision in selected patients.	Potential reduction in stereopsis and binocular visual quality.

Reference: ^[1].

Table note: These interventions provide optical compensation rather than restoration of physiological accommodation.

3.2. Conventional Pharmacological Treatments

Topical miotic agents improve near vision primarily through pupillary constriction and increased depth of focus. Their therapeutic effects are temporary and do not require restoration of physiological accommodation.

3.2.1. Pilocarpine

Pilocarpine is a muscarinic receptor agonist that induces pupillary constriction and ciliary muscle contraction.

In the GEMINI 1 randomized clinical trial, 323 adults with presbyopia received pilocarpine hydrochloride 1.25% or vehicle. On day 30, three hours after administration, 30.7% of participants receiving pilocarpine achieved an improvement of at least three lines in distance-corrected near visual acuity, compared with 8.1% receiving vehicle ^[3]. Pilocarpine 0.4% was evaluated in the NEAR-1 and NEAR-

2 phase III trials. In the pooled analysis involving 613 participants, the primary efficacy endpoint was achieved by 40.1% of participants receiving pilocarpine compared with 19.1% receiving vehicle ^[4].

The principal adverse effects of pilocarpine include headache, ocular discomfort, transient blurred vision, and reduced visual performance under low illumination. Rare retinal complications have also been reported in association with miotic therapy.

3.2.2. Aceclidine

Aceclidine 1.44% is a topical muscarinic agonist that improves near vision through pupillary constriction.

Its clinical development included the CLARITY-1 and CLARITY-2 phase III trials, involving 466 participants with presbyopia. The trials demonstrated improvement in

distance-corrected near visual acuity and supported FDA approval in 2025 ^[5].

The most frequently reported adverse reactions included instillation-site irritation (20%), dim vision (16%), headache (13%), conjunctival hyperemia (8%), and ocular hyperemia (7%). A separate six-month safety study included 217 participants ^[5].

3.2.3. Carbachol and Brimonidine

The combination of carbachol 2.75% and brimonidine tartrate 0.1% produces pupillary constriction through complementary cholinergic and adrenergic mechanisms.

In BRIO II, 436 participants were randomized to the combination or vehicle. One hour after administration, improvement of at least three lines in near visual acuity was achieved by 38.2% of participants receiving active treatment compared with 3.7% receiving vehicle.

At eight hours, the corresponding response rates were 10.2% and 3.2%, respectively ^[6].

The combination received FDA approval in February 2026. Reported adverse reactions included ocular irritation, headache, eye pain, and visual impairment.

The principal pharmacological treatments are summarized in Table 2.

Table 2: Conventional pharmacological treatments for presbyopia

Treatment	Clinical evidence	Principal efficacy findings	Safety and limitations
Pilocarpine 1.25%	GEMINI 1; 323 randomized participants.	≥3-line near-vision improvement at 3 h: 30.7% versus 8.1% with vehicle.	Temporary effect; headache, ocular discomfort, visual dimming, and retinal precautions.
Pilocarpine 0.4%	NEAR-1/NEAR-2; 613 randomized participants.	Primary endpoint achieved in 40.1% versus 19.1% with vehicle.	Temporary effect; ocular irritation, headache, and possible difficulty under low illumination.
Aceclidine 1.44%	CLARITY-1/CLARITY-2; 466 participants.	Clinically meaningful improvement in distance-corrected near visual acuity.	Instillation-site irritation (20%), dim vision (16%), headache (13%), conjunctival hyperemia (8%), and ocular hyperemia (7%).
Carbachol 2.75% + brimonidine 0.1%	BRIO II; 436 randomized participants.	≥3-line improvement at 1 h: 38.2% versus 3.7%; at 8 h: 10.2% versus 3.2%.	Ocular irritation, headache, eye pain, visual impairment, and temporary effect.

References: ^[3-6].

Table note: Results refer to different trial endpoints and populations. The response rates should not be used for indirect comparative efficacy assessments. Regulatory approval refers to the United States and does not establish availability in other countries.

3.3. Phytotherapeutic Interventions

Three herbal interventions with favorable clinical findings were identified: a combination of Cassiae Semen, wolfberry, and Dendrobium huoshanense; the herbal formulation Ocucure; and Cassiae tea.

3.3.1. Cassiae Semen, Wolfberry, and Dendrobium Huoshanense

Hornig *et al.* investigated an oral herbal formulation in 400 adults aged 45–70 years.

Each capsule contained 200 mg Cassiae Semen, 200 mg wolfberry, and 40 mg Dendrobium huoshanense.

The investigation included a six-month treatment phase and six months of follow-up. A randomized dose-comparison component involved 160 participants allocated to placebo or one, two, or three capsules daily.

After six months, the reported accommodative amplitudes reached 2.8, 2.9, and 3.2 diopters in the low-, medium-, and high-dose groups, respectively. Improvement in uncorrected near visual acuity was also reported ^[7].

However, accommodation was assessed using a subjective push-up method. The findings therefore cannot establish whether the observed improvement resulted from genuine recovery of accommodation, increased depth of focus, or other optical factors.

3.3.2. Ocucure

Khan *et al.* conducted a randomized comparative clinical trial

involving 111 participants receiving Ocucure or Leutivit for six to eight weeks.

Improvement was reported in 17 of 59 participants receiving Ocucure (28.81%), compared with 6 of 52 participants receiving the comparator (11.53%) ^[8].

The study included individuals aged 20–60 years, with a mean age of approximately 34 years. This raises uncertainty regarding the applicability of its findings to typical age-related presbyopia.

The study also provided limited information on allocation procedures, outcome definitions, and comparative safety.

3.3.3. Cassiae Tea

Fan *et al.* investigated Cassiae tea in a clinical study involving 425 participants, with a mean age of 52.5 years.

Participants consumed a preparation containing 10 g of Cassiae Semen in 500 mL of water daily. The control intervention consisted of water and vitamin C.

The investigators reported improvements in near visual acuity, pupillary diameter, tear production, and selected antioxidant parameters over six months ^[9].

However, the study incorporated several experimental subgroups, and the comparator was not an organoleptically matched inert placebo. Consequently, the contribution of masking, expectancy effects, pupillary changes, and ocular surface improvement cannot be excluded.

The phytotherapeutic interventions are summarized in Table 3.

Table 3: Phytotherapeutic interventions with favorable clinical findings

Intervention	Study design and population	Treatment	Principal findings	Limitations
Cassiae Semen + wolfberry + Dendrobium huoshanense	Hornig <i>et al.</i> , 2021; 400 adults aged 45–70 years; randomized dose-comparison component involving 160 participants.	Capsules containing 200 mg Cassiae Semen, 200 mg wolfberry, and 40 mg Dendrobium huoshanense; one to three capsules daily for six months.	Reported improvement in near visual acuity and subjective accommodative amplitude, with a dose-response pattern.	Subjective accommodation measurement; limited independent replication; no demonstrated restoration of crystalline lens elasticity.
Ocucure	Khan <i>et al.</i> , 2014; randomized comparative trial, n=111.	1,000 mg twice daily for 6–8 weeks.	Improvement in 17/59 participants (28.81%) versus 6/52 (11.53%) receiving the comparator.	Young mean age, limited methodological reporting, and uncertain applicability to typical age-related presbyopia.
Cassiae tea	Fan <i>et al.</i> , 2025; clinical investigation involving 425 participants.	Cassiae Semen tea prepared with 10 g of seeds in 500 mL of water daily for six months.	Reported improvement in near visual acuity, pupillary diameter, tear production, and selected antioxidant parameters.	Non-equivalent control intervention; possible contribution of miosis and improved ocular surface function; long-term efficacy and safety unconfirmed.

References: [7–9].

Table note: These studies reported favorable clinical findings but do not establish phytotherapy as an effective treatment for presbyopia. Subjective accommodative measurements may be influenced by pupillary diameter and depth of focus.

3.4. Nutritional and Antioxidant Supplementation

Uchino *et al.* conducted a randomized, double-blind, placebo-controlled trial involving 40 adults aged 40–49 years who regularly used visual display terminals. After four weeks, the mean change in accommodative power was $+0.20 \pm 0.50$ diopters in the antioxidant supplementation group, compared with -0.12 ± 0.48 diopters in the placebo group [10]. Although the difference was statistically significant, the

study was small and did not exclusively recruit patients with established presbyopia. Its results therefore provide indirect evidence concerning age-related accommodative function rather than definitive evidence of presbyopia treatment. Other investigations have evaluated combinations of lutein, astaxanthin, and anthocyanins in participants with computer-related visual fatigue. These studies were not included in the principal presbyopia treatment table when their populations did not meet presbyopia-specific eligibility criteria. The eligible nutritional evidence is summarized in Table 4.

Table 4: Nutritional and antioxidant interventions with favorable clinical findings

Intervention	Study design and population	Treatment duration	Principal findings	Limitations
Combined antioxidant supplementation	Uchino <i>et al.</i> , 2012; randomized, double-blind, placebo-controlled trial involving 40 adults aged 40–49 years.	Four weeks.	Mean accommodative change: $+0.20 \pm 0.50$ D versus -0.12 ± 0.48 D with placebo ($p < 0.05$).	Small sample; participants were computer users rather than an exclusively presbyopic population. No demonstration of sustained recovery of accommodation.

Reference: [10].

Table note: D = diopter. This study provides indirect evidence concerning accommodative function in middle-aged adults, not definitive evidence of treatment efficacy in established presbyopia.

3.5. Visual Exercises And Complementary Interventions

Tsuneyoshi *et al.* investigated repeated near-to-distance focusing exercises in 23 participants with a mean age of 48.5 years.

After two months, no improvement was observed in accommodative amplitude or near visual acuity. However, changes in pupillary response, convergence, and subjective satisfaction were reported [11].

These findings suggest that visual exercises may influence selected aspects of visual performance or subjective comfort without correcting the underlying accommodative deficit. No sufficiently established presbyopia-specific clinical efficacy was identified for acupuncture, auriculotherapy, reflexology, or homeopathy. These modalities were therefore not included among the treatments with demonstrated efficacy in the principal evidence tables.

4. Discussion

The present narrative review demonstrates that non-surgical presbyopia management encompasses interventions with fundamentally different mechanisms of action and

substantially different levels of clinical validation.

Optical correction and topical miotic agents provide established improvements in near visual performance. In contrast, phytotherapeutic and nutritional interventions have produced favorable findings in individual clinical investigations but remain insufficiently validated for routine presbyopia treatment.

An essential distinction is that improved near visual acuity does not necessarily indicate restoration of physiological accommodation. This distinction is particularly relevant when interpreting the effects of miotic medications, herbal preparations, and nutritional interventions.

4.1. Optical Correction and Functional Visual Improvement

Optical correction remains a central component of presbyopia management because it provides predictable improvement in near vision without requiring pharmacological exposure or invasive procedures.

The selection of reading spectacles, progressive lenses, occupational spectacles, multifocal contact lenses, or

monovision depends on individual refractive characteristics, visual demands, and tolerance.

Although these interventions provide functional improvement, they do not reverse the biomechanical changes responsible for presbyopia ^[1].

4.2. Pharmacological Treatment And Increased Depth Of Focus

The development of topical miotic agents represents an important advance in the non-surgical management of presbyopia.

Pilocarpine, aceclidine, and carbachol combined with brimonidine have demonstrated improvements in near visual acuity in randomized clinical trials ^[3-6].

Their principal mechanism involves reduction of pupillary diameter, which increases depth of focus and permits clearer near vision despite insufficient accommodative capacity.

However, pupillary constriction also reduces retinal illumination, potentially compromising visual performance under low-light conditions.

The duration of pharmacological benefit is limited, and repeated administration may be required according to the approved formulation.

Furthermore, ocular discomfort, headache, visual dimming, and retinal safety precautions must be considered when selecting patients for treatment.

The available evidence supports these agents as temporary functional treatments rather than interventions capable of reversing crystalline lens stiffening.

4.3. Phytotherapy And Possible Mechanisms Of Visual Improvement

The clinical investigations of herbal preparations are particularly interesting because they suggest that non-conventional interventions may influence near visual performance.

Hong *et al.* reported improvements in accommodative amplitude and near visual acuity following administration of a combination of Cassiae Semen, wolfberry, and Dendrobium huoshanense ^[7].

Nevertheless, the use of subjective accommodation measurements introduces uncertainty regarding the physiological mechanism responsible for the observed effects.

A smaller pupil increases depth of focus and may permit an individual to identify a near target at a shorter distance without a corresponding increase in the crystalline lens's accommodative power.

Consequently, the apparent increase in accommodative amplitude reported in the herbal study cannot be interpreted as definitive evidence of restored lens elasticity.

The Ocucure trial also reported favorable results, but the inclusion of participants substantially younger than the typical age of presbyopia onset limits the applicability of its findings ^[8].

The Cassiae tea investigation reported improvements in near visual acuity, pupillary diameter, and tear production ^[9].

These findings suggest that changes in pupil size and ocular surface function may contribute to improved visual performance.

However, the contribution of these mechanisms cannot be

separated from a potential direct effect on accommodation without additional objective measurements.

An additional limitation concerns the standardization of herbal preparations. Botanical identification, extraction procedures, active compound concentrations, and potential contaminants may influence both efficacy and safety.

Independent replication using standardized formulations is therefore essential before these interventions can be recommended for routine clinical use.

4.4. Antioxidants and Accommodative Function

Oxidative modifications of crystalline lens proteins have been proposed as contributors to age-related changes in lens biomechanics.

This provides a biological rationale for investigating antioxidant supplementation as a potential strategy for preserving accommodative function.

Uchino *et al.* reported a statistically significant improvement in accommodative measurements following four weeks of antioxidant supplementation ^[10].

However, the absolute difference in mean accommodative change between the intervention and placebo groups was approximately 0.32 diopters.

The clinical relevance of this magnitude of improvement remains uncertain, particularly in patients with advanced presbyopia who require substantially greater near-addition power.

Moreover, the study included adults with computer-related visual demands rather than an exclusively presbyopic population.

The findings therefore support further investigation but do not establish antioxidant supplementation as an effective treatment for established presbyopia.

Future trials should distinguish between preservation of residual accommodation in early presbyopia and restoration of accommodative function in more advanced disease.

4.5. Complementary Medicine And Visual Rehabilitation

The available clinical evidence does not establish visual exercises as an effective treatment for the underlying accommodative deficit of presbyopia.

In the study by Tsuneyoshi *et al.*, repeated focusing exercises improved selected pupillary and convergence parameters but did not improve accommodative amplitude or near visual acuity ^[11].

This distinction is clinically relevant because patients may report improved visual comfort without demonstrating objective correction of presbyopia.

Visual rehabilitation may be useful in individuals with coexisting binocular vision abnormalities or accommodative dysfunction. However, evidence obtained in these conditions should not be extrapolated to age-related crystalline lens stiffening.

Similarly, potential benefits of acupuncture or other complementary interventions in unrelated ophthalmological conditions cannot be considered evidence of efficacy for presbyopia.

4.6. Safety Considerations

Safety assessment is particularly important because presbyopia is a common age-related condition that may

require long-term management.

Optical correction generally avoids pharmacological exposure, whereas topical miotic agents may cause ocular and systemic adverse effects.

Retinal complications associated with miotic therapy, although uncommon, warrant appropriate ophthalmological assessment and counseling.

The safety evidence for phytotherapeutic and nutritional interventions is less extensive.

Absence of reported serious adverse events in small or short-term studies does not establish long-term safety, particularly when formulations contain multiple botanical ingredients or are intended for repeated administration.

Future clinical investigations should systematically report adverse events, treatment discontinuations, ocular examinations, and clinically relevant laboratory findings when appropriate.

4.7. Methodological Limitations And Future Research

The available evidence is heterogeneous regarding participant age, presbyopia severity, intervention composition, treatment duration, and outcome measurement. A major limitation of several phytotherapeutic and nutritional studies is the use of subjective accommodative

measurements, which may be influenced by depth of focus, pupillary diameter, and participant response.

Objective accommodation measurements should therefore be prioritized in future investigations.

Additional clinically meaningful outcomes should include standardized near visual acuity, reading speed, reading-add requirements, contrast sensitivity, patient-reported visual function, and long-term safety.

Randomized, adequately powered, independently replicated trials are particularly necessary for herbal and nutritional interventions.

The present review also has limitations. Its narrative design and targeted identification of clinical studies do not permit estimation of the complete balance of positive, negative, and inconclusive evidence. In addition, no formal outcome-specific risk-of-bias assessment or quantitative meta-analysis was performed.

Consequently, favorable findings from individual studies should be interpreted cautiously and should not be equated with established clinical efficacy.

Table 5: Visual exercises and complementary interventions: presbyopia-specific evidence

Intervention	Study design and population	Findings	Clinical interpretation
Near-to-distance focusing exercises	Tsuneyoshi <i>et al.</i> , 2021; clinical investigation involving 23 participants, mean age 48.5 years; two months of training.	No improvement in accommodative amplitude or near visual acuity. Changes in pupillary response, convergence, and subjective satisfaction were observed.	Possible improvement in selected functional or subjective parameters without demonstrated correction of presbyopia.

Reference: [11].

Table note: Acupuncture, auriculotherapy, reflexology, and homeopathy were not included because presbyopia-specific clinical efficacy has not been sufficiently demonstrated.

5. Conclusions

Non-surgical management of presbyopia includes established optical correction, approved topical pharmacological treatments, and several phytotherapeutic and nutritional interventions that have produced favorable findings in individual clinical investigations.

Spectacles and contact lenses provide effective optical compensation for accommodative loss, while topical miotic agents temporarily improve near visual acuity through increased depth of focus.

Herbal formulations containing Cassiae Semen, wolfberry, and *Dendrobium huoshanense*, Cassiae tea, and selected antioxidant combinations have demonstrated improvements in near visual performance or measured accommodative function. However, these findings require independent confirmation through adequately powered clinical trials incorporating objective accommodation measurements and comprehensive safety assessment.

Current evidence does not establish that phytotherapy, nutritional supplementation, visual exercises, or complementary medicine can reverse age-related crystalline lens stiffening or restore physiological accommodation.

Future research should focus on interventions capable of producing clinically meaningful, reproducible, and sustained improvements in near vision while distinguishing optical compensation from genuine restoration of accommodative function.

Declarations

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Conflicts of Interest

The authors declares that they have no conflicts of interest related to this work.

Data Availability Statement

All information discussed in this narrative review was derived from previously published studies. No new individual participant data were generated or analyzed.

Ethics Approval

Ethics committee approval was not required because this narrative review was based exclusively on previously published literature and did not involve the collection of new individual participant data.

Consent to Participate

Not applicable.

Consent for Publication

Not applicable.

Artificial Intelligence (AI) Use Disclosure

The manuscript was originally written by the authors in

Portuguese. A generative artificial intelligence tool (ChatGPT, OpenAI) was used to assist with translation into English and subsequent language editing, including improvements in grammar, clarity, readability, and academic style. The authors critically reviewed and edited all AI-assisted text and take full responsibility for the accuracy, integrity, interpretation, and final content of the manuscript. The AI tool was not used to generate or modify study data or to independently determine the interpretation of the evidence, and it is not listed as an author.

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