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PREVALENCE OF PREMATURE PRESBYOPIA: A SYSTEMATIC REVIEW

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ABSTRACT

A frequent age-related visual condition called presbyopia is characterized by a progressive loss of near-object focus. Patients' quality of life may be greatly impacted by presbyopia if it is left untreated or improperly treated. .Presbyopia represents an area of considerable unmet need due to its rising prevalence worldwide as the population ages, the high proportion of under-treated individuals in some parts of the world, and the limitations of currently available corrective methods. Wearing progressive or bifocal glasses has been connected to peripheral blur, a constricted field of vision, and diminished depth perception—all of which have been connected to an elevated risk of falls among the older population. Age-related dry eye issues and decreased manual dexterity might make it challenging to maintain contact lens alternatives. Maintaining contact lens alternatives might be challenging because of age-related dry eye problems and decreased hand dexterity. Additional techniques of correction entail surgical procedures aimed at restoring active accommodation, replacing the crystalline lens, or altering the optics of the cornea. Even while surgical patients report positive results after their procedures, many of them eventually need reading glasses. In presbyopia, the patient journey and diagnosis process are described, and different treatment options are examined. The information presented here indicates serious deficiencies in the availability of vision correction for this prevalent ailment, with few widely available, non-invasive, and efficacious treatment choices for presbyopic patients.

Keywords: Presbyopia, progressive or bifocal glasses, dexterity, accommodation, vision, non-invasive

1. INTRODUCTION

Presbyopia is a common age-related vision condition that affects the ability of the eye to focus on close objects. Typically, this condition occurs around the age of 40 as the eye's natural lens loses flexibility, making it difficult to see objects up close. Individuals with presbyopia often experience symptoms such as blurry vision when reading or performing close-up tasks, eye strain, and difficulty focusing on small print. This condition can be easily corrected with eyeglasses, contact lenses, or surgical procedures, making it manageable for those affected. Regular eye examinations are essential to monitor changes in vision and adjust prescriptions as needed Presbyopia is a typical age-related visual condition marked by a gradual inability to focus on close objects. Presbyopia is thought to be caused by ciliary muscle weakness or lack of lens flexibility, which prevents focus point change[1,2.]While the genesis of this illness is not completely understood, recent research suggests that an increase in lens stiffness is the key causal factor.[34] Although corrective procedures exist to restore near vision, access to therapy (usually in the form of reading glasses) is restricted in some parts of the world. In 2015, 826 million of the 1.8 billion people projected to have functional presbyopia were found to have uncorrected near vision impairment due to a lack of access to vision correction or the use of insufficient correction[5]Presbyopia, without optical correction, can have a variety of effects on quality of life, including reading difficulties (inability to read fine print, need for increased lighting, diplopia, epiphora, headache fatigue, or asthenopia), as well as other tasks like threading a needle or seeing fine details on proximal objects[6]

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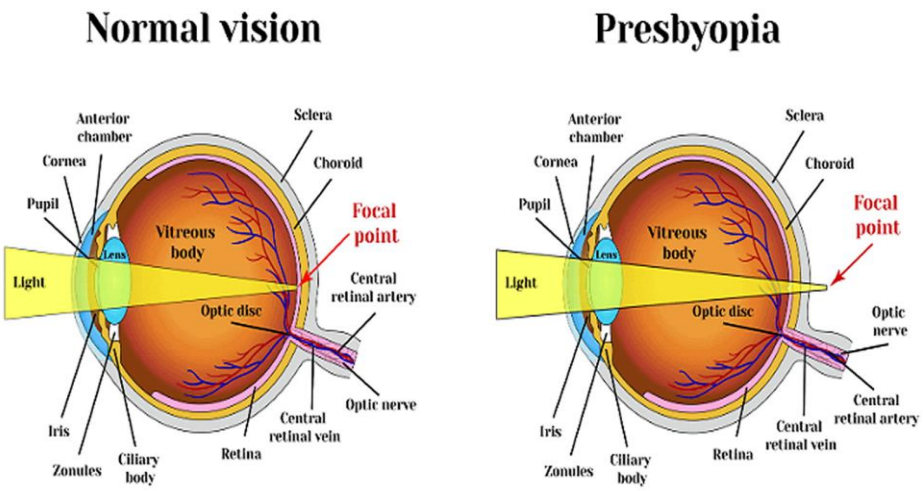

Presbyopia: Types

Presbyopia is primarily classified into two main types based on the underlying mechanism that causes the condition:

Index Presbyopia: Index presbyopia occurs due to changes in the refractive index of the lens, specifically the crystalline lens inside the eye. With age, the crystalline lens loses its flexibility and ability to change shape easily, leading to difficulty in focusing on near objects. This type of presbyopia is the most common and is typically addressed with corrective lenses.

Gradient Presbyopia: Gradient presbyopia is attributed to changes in the lens gradient index, which refers to variations in refractive power from the center to the periphery of the lens. As individuals age, the gradient index of the lens alters, affecting the eye's ability to focus on nearby objects. This type of presbyopia can also be corrected with appropriate lenses or surgical interventions.

Prevalence and Quality of Life Impact

Presbyopia is a prevalent condition that affects a large portion of the global population, particularly as individuals age. The prevalence of presbyopia increases with advancing age, with nearly everyone over the age of 50 experiencing some degree of presbyopia. According to the World Health Organization (WHO), it is estimated that over 1.8 billion people worldwide are affected by presbyopia. The impact of presbyopia on an individual's quality of life can be significant. As the ability to focus on near objects diminishes, everyday tasks such as reading, using digital devices, or engaging in close-up work become challenging. The symptoms of presbyopia, such as blurred vision, eye strain, and headaches, can lead to increased frustration and decreased productivity in both professional and personal settings. In addition to the practical challenges, presbyopia can also have emotional and social implications. Individuals with untreated presbyopia may feel self-conscious about wearing corrective lenses or struggle with feelings of frustration over their changing vision. This can affect their confidence, social interactions, and overall well-being. Fortunately, advancements in eyewear technology and surgical procedures have made managing presbyopia more accessible and effective. Eyeglasses, contact lenses, and surgical options like laser vision correction or lens implants

can provide significant improvements in vision for individuals with presbyopia, enhancing their quality of life and restoring their ability to perform daily tasks comfortably. Regular eye examinations are essential for early detection and management of presbyopia. By discussing symptoms with an eye care professional and exploring suitable treatment options, individuals can effectively address presbyopia and maintain their quality of life as they age. Presbyopia is more common and severe as people age, affecting up to ~85% of those over 40.[5]Presbyopia affected an estimated 1.8 billion individuals worldwide, with the prevalence anticipated to reach 2.1 billion by 2030.Although the measured prevalence of presbyopia is higher in nations with longer life expectancies, it is estimated that 94% of persons with significant near vision handicap caused by uncorrected presbyopia live in developing countries.[7]According to studies, many countries undercorrect for presbyopia, with reading glasses available to only 6-45% of patients in developing countries.[7] Uncorrected presbyopia is common in various parts of the world due to a lack of effective diagnosis and reasonable therapy.Citation8-Citation[11]

Presbyopia Risk Factors

Several factors can contribute to the development of presbyopia, a common age-related vision condition. While aging is the primary risk factor for presbyopia, there are other factors that can influence its onset and severity. Some of the key risk factors for presbyopia include:

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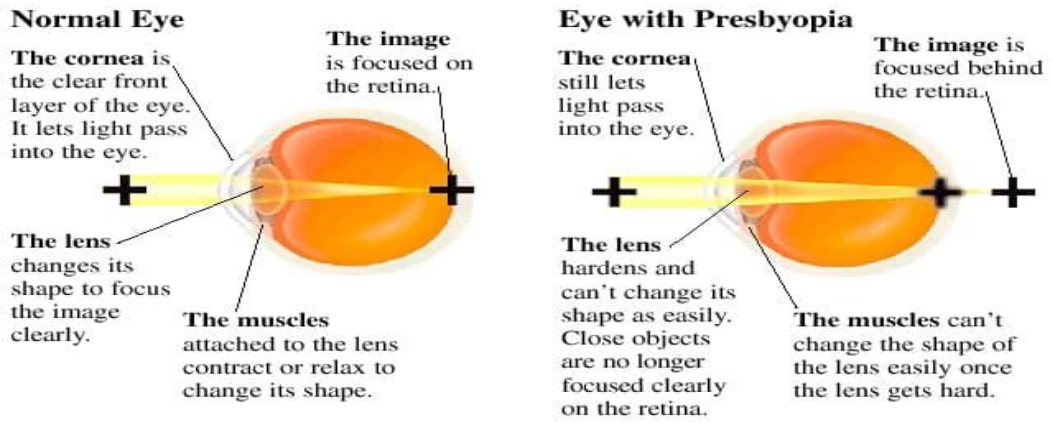
- **Age:** The most significant risk factor for presbyopia is advancing age. The natural aging process causes changes in the eye's lens, leading to a gradual loss of flexibility and making it harder to focus on close-up objects.
- **Genetics:** A family history of presbyopia may increase the likelihood of developing the condition at an earlier age or experiencing more severe symptoms. Genetic factors can play a role in the structural changes that occur in the eye over time.
- **Environmental Factors:** Prolonged exposure to factors such as UV radiation, poor lighting conditions, or eye strain from excessive screen time can contribute to the onset or progression of presbyopia.
- **Systemic Conditions**: Certain systemic conditions, such as diabetes or hypertension, can affect the eyes and contribute to changes in vision, including presbyopia.
- **Medications:** Some medications, particularly those that affect blood flow or fluid balance in the body, may have an impact on eye health and vision, potentially increasing the risk of presbyopia.
- **Lifestyle Choices**: Factors like smoking, poor nutrition, and lack of regular eye care can also influence the risk of developing presbyopia and other vision problems.

Refractive Status

There is a lack of literature on baseline refractive error in presbyopes. A prospective examination of 473 patients with presbyopia at a rural tertiary teaching hospital in India found that little under half (49.7%) had emmetropes, 30.3% had hyperopic correction, and 20% had myopic correction[7] The refractive status of presbyopia refers to how the condition impacts the eye's ability to refract light and focus on objects at different distances. In presbyopia, the eye's ability to accommodate or change focus from near to far objects is reduced, leading to difficulty in reading, using a computer, or performing other near tasks. There are several ways to correct the refractive status of presbyopia. Reading glasses are a common solution for individuals with presbyopia. These glasses have a prescription that helps to compensate for the loss of near vision, making it easier to see close objects clearly. Another option is progressive lenses, which have a gradual change in prescription from the top of the lens (for distance vision) to the bottom (for near vision). Progressive lenses provide a seamless transition between different distances and are a popular choice for people with presbyopia who want a more natural-looking solution. Bifocal or trifocal lenses are also used to correct presbyopia. These lenses have distinct areas for near, intermediate, and distance vision, allowing the wearer to see clearly at different distances without needing to switch between multiple pairs of glasses. Contact lenses are another option for correcting presbyopia. Multifocal contact lenses have different powers in different zones of the lens, allowing for clear vision at multiple distances. Monovision contact lenses, where one eye is corrected for distance vision and the other for near vision, can also be effective for some people with presbyopia. Surgical options for correcting presbyopia include procedures such as monovision LASIK or PRK, where one eye is corrected for near vision and the other for distance vision. Refractive lens exchange (RLE) is another surgical option where the eye's natural lens is replaced with a multifocal or accommodating lens to restore clear vision at multiple distances.

Sex

Women over the age of 40 are more likely to develop presbyopia than men of the same age.[21]The increased need for presbyopia correction in women is thought to be due to variations in job performance and viewing distance needs, rather than physiological gender differences in accommodation processes



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Diagnosis of Presbyopia:

Presbyopia is a common age-related condition that affects the ability of the eye to focus on close objects. Typically, it starts to become noticeable around age 40 and progresses over time. The main symptom is difficulty focusing on close-up objects, such as books or screens. Diagnosing presbyopia usually involves a comprehensive eye exam by an eye care professional. During the exam, your eye doctor will assess your visual acuity, refractive error, and near vision. They may conduct tests such as a visual acuity test, a refraction test, and a test to measure your near vision. Your eye doctor may also perform a test to determine your prescription for reading glasses or bifocals. This may involve using different lenses and asking you to read from a near-distance chart to determine the level of correction needed. It's important to have regular eye exams, especially as you age, to monitor changes in your vision and address any vision problems early on. If you are experiencing symptoms of presbyopia, such as difficulty reading or seeing close-up objects clearly, make an appointment with an eye care professional for an evaluation and proper diagnosis**.** Optometrists are the most common practitioners of vision correction worldwide, albeit they primarily work in private practice rather than community settings.[22] However, there are significant disparities in optometric service delivery among countries. Most US optometrists see presbyopes on a regular basis in private offices.[21] Contrast to European primary eye care approaches, which are more diverse. Within Europe, ophthalmologists nearly solely provide eye care in France, whilst optometrists are the principal providers in the United Kingdom. The German system is a hybrid paradigm in which both ophthalmologists and optometrists perform essential components of primary eye care.[23]Presbyopia is commonly diagnosed around the age of 50, and case studies show that people in industrialized countries who have never had an eye test before the age of 50 are more likely to be emmetropic or hyperopic.[16] In India, patients with myopia seek treatment for presbyopia later than emmetropes and hyperopes of the same age.[5] In some circumstances, the growing prevalence of myopia has been linked to a decrease in the age-specific prevalence of presbyopia, which reduces the accommodative demand of people who do not wear glasses.[5]Before presenting for an eye exam, presbyopes frequently self-diagnose and may use over-the-counter (OTC) reading (or magnifying) spectacles as an initial solution to a decrease in near visual acuity.[6] This could be influenced by economic status, which has been linked to the frequency with which presbyopes in an American community seek eye care and obtain spectacles.[24]

Presbyopic Treatment Options

There are several treatment options available for presbyopia, ranging from corrective lenses to surgical procedures. One popular treatment option is the use of multifocal intraocular lenses (IOLs) or monovision correction. Multifocal IOLs are artificial lenses that are implanted during cataract surgery or as a standalone procedure to correct presbyopia. These lenses have different zones that allow for clear vision at varying distances. This means that one can see objects clearly both up close and at a distance without the need for reading glasses or bifocals. On the other hand, monovision correction involves correcting one eye for distance vision and the other eye for near vision. This can be achieved through contact lenses, LASIK, or intraocular lens implants. While some people may find it challenging to adjust to monovision initially, many patients eventually adapt and find it to be an effective solution for presbyopia. Another option for presbyopia is conductive keratoplasty (CK), a minimally invasive procedure that uses radiofrequency energy to reshape the cornea, improving near vision. CK is typically performed on one eye to correct presbyopia and reduce the need for reading glasses. This procedure is quick, painless, and has a fast recovery time. For those who prefer a non-invasive treatment option, reading glasses or progressive lenses can effectively correct presbyopia. These lenses provide clear vision at near, intermediate, and distance ranges by gradually transitioning the prescription from top to bottom. They are a simple and cost-effective solution for managing presbyopia. Additionally, there are emerging treatments for presbyopia, such as corneal inlays and pharmaceutical interventions. Corneal inlays are small devices that are implanted in the cornea to improve near vision. These inlays work by extending the depth of focus of the eye, allowing for clearer close-up vision. Pharmaceutical interventions involve eye drops or topical medications that aim to restore the flexibility of the natural lens or alter the shape of the cornea to improve near vision. While these treatments are still being researched and developed, they hold promise as potential options for managing presbyopia in the future. It is important to consult with an eye care professional to determine the best treatment option for presbyopia based on individual needs and preferences. Treatment options may vary depending on factors such as overall eye health, lifestyle, and desired outcomes. By exploring these various treatment options with the guidance of an eye care specialist, individuals can find a solution that addresses their presbyopia and improves their quality of life. Surgical management of presbyopia offers long-term solutions for correcting age-related near vision loss. There are several surgical procedures available to address presbyopia, each with its own benefits and considerations. Here are some common surgical options for managing presbyopia:

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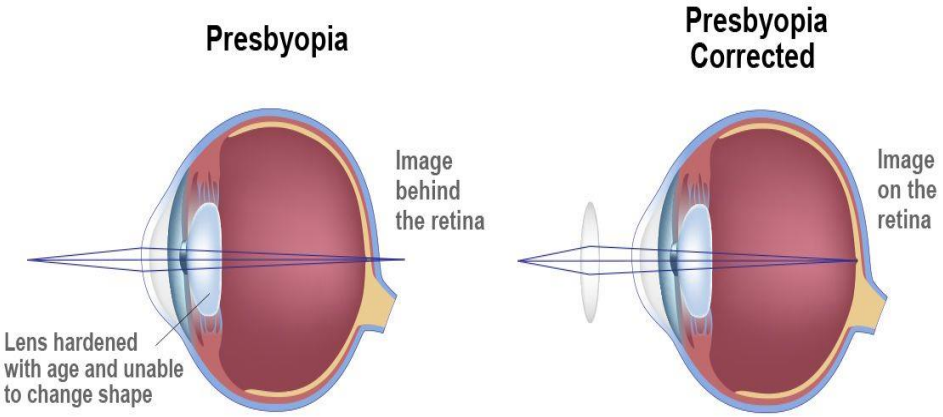
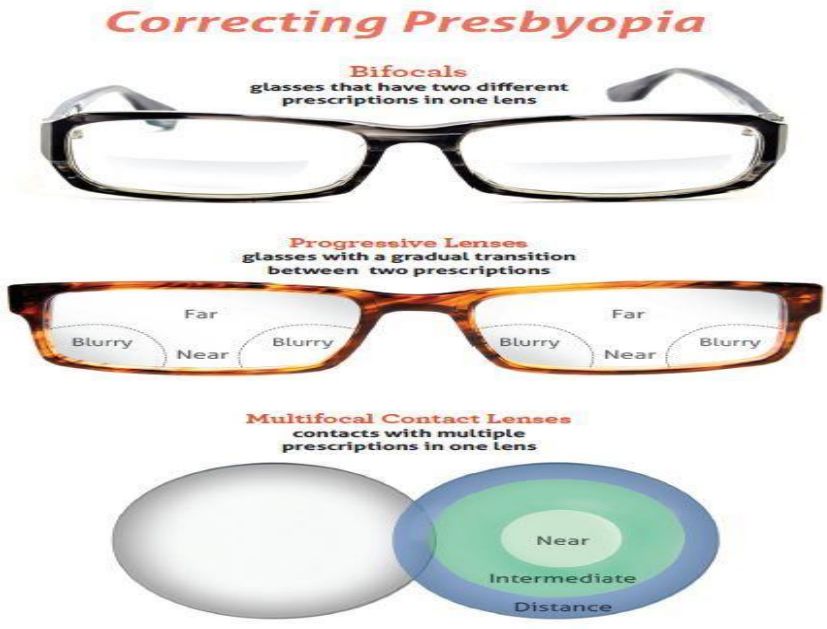


- **Refractive Lens Exchange (RLE) with Multifocal or Accommodating Intraocular Lenses (IOLs):** RLE is a procedure similar to cataract surgery, where the natural lens of the eye is replaced with an artificial intraocular lens. Multifocal or accommodating IOLs can be used during RLE to provide clear vision at multiple distances. Multifocal IOLs have different zones to allow for near, intermediate, and distance vision, while accommodating IOLs move within the eye to adjust focus similar to the natural lens.
- **Corneal Inlays:** Corneal inlays are small devices that are surgically implanted in the cornea of one eye to improve near vision. These inlays work by reshaping the cornea to extend the depth of focus, enabling better near vision without compromising distance vision. Corneal inlays are typically used in monovision procedures, where one eye is adjusted for near vision and the other for distance vision.
- **Conductive Keratoplasty (CK):** CK is a minimally invasive procedure that uses radiofrequency energy to reshape the cornea, improving near vision. By increasing the curvature of the cornea, CK can enhance near vision in individuals with presbyopia. This procedure is quick, typically taking less than 5 minutes per eye, and has a fast recovery time.
- **LASIK with Monovision:** LASIK, a common procedure for correcting refractive errors like nearsightedness and farsightedness, can also be used for presbyopia. In monovision LASIK, one eye is corrected for near vision, while the other eye is corrected for distance vision. While some individuals may find it challenging to adapt to monovision initially, many patients eventually adjust well and find it to be an effective solution for presbyopia.
- **Refractive Surgeries:** Other surgical options for presbyopia include procedures like photorefractive keratectomy (PRK) and laser-assisted subepithelial keratectomy (LASEK). These surgeries reshape the cornea to correct refractive errors, and monovision can also be applied to address presbyopia in these procedures.



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Contact Lenses:

Presbyopia contact lens solutions include single vision distance correction with reading glasses to provide the necessary near addition, monovision correction, or a bi-/multifocal correction based on alternating or simultaneous image principles.[26,30]When used with reading spectacles, a single vision soft or rigid gas permeable (RGP) contact lens correction can provide optimal far and near vision at a lower cost and with fewer fitting issues than multifocal solutions. Patients, however, continue to be inconvenienced by having to put on and take off their spectacles to read.[31]

Monovision and enhanced monovision correction entails correcting one eye for optimal distant viewing and the other with a single vision near or bi-/multifocal contact lens.[31]Although monovision lenses are often less expensive and easier to install than multifocal lens designs, a major disadvantage is a reduction in stereopsis and contrast sensitivity, both of which are necessary for critical visual tasks such as driving.[36]

Unmet Needs of Presbyopic Patients:

Despite the fact that the global prevalence of presbyopia continues to rise in tandem with population growth.[5]Patients' experiences with presbyopic treatment alternatives have not been well examined, despite growing interest in the subject. A recent social media listening study indicated that individuals with presbyopia faced issues with reading and electronic gadgets, as well as feeling inconvenienced by the use of varifocal glasses and contact lenses While there are several treatment options available to address presbyopia, there are still some unmet needs and challenges faced by presbyopic patients:

- **Desire for Non-Surgical Options:** Many individuals are looking for non-invasive or non-surgical alternatives to correct presbyopia. While reading glasses and contact lenses are common solutions, some people may prefer non-invasive treatments or procedures that do not involve surgical intervention.
- **Customized Treatment Approaches:** Presbyopia is a complex vision issue that affects individuals differently. There is a need for more personalized and customized treatment approaches that take into account each person's unique eye anatomy, lifestyle, visual demands, and preferences. Tailored solutions can help optimize outcomes and patient satisfaction.
- **Long-Term Visual Stability:** Some surgical procedures for presbyopia, such as monovision LASIK or RLE with multifocal IOLs, may provide effective near vision correction initially but can lead to decreased contrast sensitivity, halos, glare, or other visual disturbances over time. Patients may seek options that offer long-term visual stability and minimize the risk of complications or side effects.
- **Affordability and Accessibility:** Cost can be a significant factor for individuals considering presbyopia treatment options. While surgical procedures like RLE with premium IOLs can be effective, they may come with a higher price tag that is not feasible for everyone. Increased affordability and accessibility to a range of presbyopia treatment options are essential for meeting the diverse needs of patients.
- **Improved Education and Awareness:** Many individuals may not be aware of the available treatment options for presbyopia or may have misconceptions about the safety and effectiveness of different procedures. There is a need for increased public education and awareness campaigns to inform individuals about presbyopia, its treatment options, and the importance of regular eye examinations for early detection and management.
- **Combination Therapies:** While current treatments for presbyopia can address near vision issues, some patients may benefit from combination therapies that target other visual aspects, such as depth perception, night vision, or contrast sensitivity. Research into innovative combination therapies or multi-modal approaches could provide more comprehensive solutions for presbyopic patients.
- **Age-Appropriate Care:** As presbyopia is a natural part of the aging process, there is a need for age-appropriate eye care that considers the unique visual needs and challenges faced by older individuals. Eye care professionals should be equipped to provide comprehensive, geriatric-focused care for presbyopic patients, addressing not only near vision but also other age-related eye health issues.

2. FUTURE OUTLOOK FOR PRESBYOPIA

Overall, the future of presbyopia management is marked by a shift towards personalized, minimally invasive, and multi-disciplinary approaches that aim to improve the quality of life and visual outcomes for individuals affected by age-related near vision changes.

By harnessing the latest advancements in ophthalmic technology, research, and patient care, we can continue to enhance the options available for presbyopia correction and provide tailored solutions that meet the diverse needs of presbyopic patients.

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3. CONCLUSION

In conclusion, the future outlook for presbyopia is promising, driven by ongoing research, technological advancements, and innovative treatment options that aim to revolutionize the management of age-related near vision changes. From personalized medicine approaches to advanced surgical techniques, emerging technologies, and potential breakthroughs in gene therapy and regenerative medicine, the landscape of presbyopia correction is evolving towards more effective, minimally invasive, and patient-centered solutions. By harnessing the power of interdisciplinary collaboration, precision medicine, and cutting-edge technologies, ophthalmologists and researchers are committed to improving the quality of life and visual outcomes for individuals affected by presbyopia. With a focus on individualized care, customized treatments, and holistic approaches to vision correction, the future holds great promise for enhancing the options available for presbyopic patients and delivering tailored solutions that best meet their unique needs.As we continue to push the boundaries of innovation, explore new frontiers in treatment modalities, and strive for excellence in presbyopia management, we are poised to transform the way we understand, diagnose, and address age-related near vision changes. With a collective effort towards advancing the field of ophthalmology, we can look forward to a future where presbyopia is not just managed, but truly optimized for each individual, empowering them to see the world more clearly and confidently at every stage of life.

Conflict of Interest: No

4. REFERENCES

[1] Glasser A, Campbell MC. Biometric, optical and physical changes in the isolated human crystalline lens with age in relation to presbyopia. Vision Res. 1999;39(11):1991–2015. doi:10.1016/S0042-6989(98)00283- PubMed Web of Science ®Google Scholar

[2] Heys K, Cram LS, Roger J. University of Wollongong. Massive increase in the stiffness of the human lens nucleus with age: the basis for presbyopia? Molecular Vision. 2004;10:956–963. PubMed Web of Science ®Google Scholar

[3] Garner WH, Garner MH. Protein disulfide levels and lens elasticity modulation: applications for presbyopia. Invest Ophthalmol Vis Sci. 2016;57(6):2851–2863. doi:10.1167/iovs.15-18413PubMed Web of Science ®Google Scholar

[4] David G, Pedrigi RM, Humphrey J. Accommodation of the human lens capsule using a finite element model based on nonlinear regionally anisotropic biomembranes. Computer MethodsBiomechanics Biomed Eng. 2017;20(3):302–307. doi:10.1080/10255842.2016.1228907 PubMed Web of Science ®Google Scholar

[5] Fricke TR, Tahhan N, Resnikoff S, et al. Global Prevalence of Presbyopia and Vision Impairment from Uncorrected Presbyopia: systematic Review, Meta-analysis, and Modelling. Ophthalmology.2018;125(10):1492–doi:10.1016/j.ophtha.2018.04.013 PubMed Web of Science ®Google Scholar

[6] Mancil G, Bailey I, Brookman K. Optometric clinical practice guideline care of the patient with presbyopia. Reference guide for clinicians. Am Optometric Assoc. 2011;1:458. Google Scholar

[7] Goertz AD, Stewart WC, Burns WR, Stewart JA, Nelson LA. Review of the impact of presbyopia on quality of life in the developing and developed world. Acta Ophthalmol. 2014;92(6):497–500. doi:10.1111/aos.12308 PubMed Web of Science ®Google Scholar

[8] Chan VF, MacKenzie GE, Kassalow J, Gudwin E, Congdon N. Impact of presbyopia and its correction in low- and middle-income countries. Asia Pacific J Ophthalmol. 2018;7(6):370–374. doi:10.22608/APO.2018449 Web of Science ®Google Scholar

[9] Han X, Lee PY, Liu C, He M. Distribution and progression of add power among people in need of near correction. Clin Experiment Ophthalmol. 2018;46(8):882–887. doi:10.1111/ceo.13301 Web of Science ®Google Scholar

[10] Holden BA, Fricke TR, Ho SM, et al. Global vision impairment due to uncorrected presbyopia. ArchOphthalmol.2008;126(12):1731doi:10.1001/archopht.126.12.1731 PubMedGoogle Scholar

[11] Gajapati CV, Pradeep A, Kakhandaki A, Praveenchandra R, Rao S. Awareness of Presbyopia among Rural Female Population in North Karnataka. J Clin Diagnostic Res. 2017;11(9):NC01. doi:10.7860/JCDR/2017/26125.10608 Web of Science ®Google Scholar

[12] Patel I, Munoz B, Burke AG, et al. Impact of presbyopia on quality of life in a rural African setting. Ophthalmology. 2006;113(5):728–734. doi:10.1016/j.ophtha.2006.01.028 PubMed Web of Science ®Google Scholar

[13] Reddy PA, Congdon N, MacKenzie G, et al. Effect of providing near glasses on productivity among rural Indian tea workers with presbyopia (PROSPER): a randomised trial. Lancet Global Health. 2018;6(9):e1019–e1027. doi:10.1016/S2214-109X(18)30329-2 Web of Science ®Google Scholar

[14] Wolffsohn JS, Davies LN. Presbyopia: effectiveness of correction strategies. Prog Retin Eye Res. 2019;68:124–143. Web of Science ®Google Scholar

[15] Bilbao-Calabuig R, Gónzalez-López F, Llovet-Rausell A, Ortega-Usobiaga J, Fernández VT, Llovet-Osuna F. Lens-based surgical correction of presbyopia. Where are we in 2020? Arch de la Sociedad Española de Oftalmología. 2020.Google Scholar

[16] Carlson NB, Aurora Denial O. Hyperopia and presbyopia: a teaching case report. Optometric Educ. 2017;42(3):78. Google Scholar

[17] Weale RA. Epidemiology of refractive errors and presbyopia. Surv Ophthalmol. 2003;48(5):515–543. doi:10.1016/S0039-6257(03)00086-9 PubMed Web of Science ®Google Scholar

[18] Stevens M, Bergmanson J. Does sunlight cause premature aging of the crystalline lens? J Am Optom Assoc. 1989;60(9):660–663. Google Scholar

[19] Sliney DH. Geometrical gradients in the distribution of temperature and absorbed ultraviolet radiation in ocular tissues. Dev Ophthalmol. 2002;35:40–59. Google Scholar

[20] Babu PS, Dhanunjaya A, Amaresh G. Demographic pattern of presbyopia in a tertiary teaching hospital. J Evolution Med Dental Sci. 2015;4:650–657. doi:10.14260/jemds/2015/95 Google Scholar

[21] Hickenbotham A, Roorda A, Steinmaus C, Glasser A. Meta-analysis of sex differences in presbyopia. Invest Ophthalmol Vis Sci. 2012;53(6):3215–3220. doi:10.1167/iovs.12-9791 PubMed Web of Science ®Google Scholar

[22] Oriahi M. The Importance Of Epidemiology In Optometry. J Nigerian Optometric Assoc. 2009;15:48–51.Google Scholar

[23] Thomas D, Weegen L, Walendzik A, Wasem J, Jahn R Comparative analysis of delivery of primary eye care in three European countries. Available from: https://www.ecoo.info/wp-content/uploads/2012/07/WASEMstudyWebsite.pdf. Accessed 3 January, 2021. Google Scholar

[24] Wubben T, Wolfe G, Guerrero C, Korcz WJ, Ramsey DJ. Near visual acuity in an inner city Hispanic community: understanding the barriers and benefits of correction. Community Eye Health. 2014;27(86):41Google Scholar

[25] Doan B, Lévy D, Pavot J. Demographic forecasts of medical workforce supply in France (2000–2050). What numerus clausus for what future? Cahiers De Sociologie et de Démographie Médicales. 2004;44(1):101–148.PubMedGoogle Scholar

[26] Charman WN. Developments in the correction of presbyopia I: spectacle and contact lenses. Ophthalmic Physiol Optics. 2014;34(1):8–29. doi:10.1111/opo.12091 Web of Science ®Google Scholar

[27] Charman WN. Non-surgical treatment options for presbyopia. Expert Rev Ophthalmol. 2018;13(4):219–231. doi:10.1080/17469899.2018.1506330Web of Science ®Google Scholar

[28] Sánchez-Brau M, Domenech-Amigot B, Brocal-Fernández F, Quesada-Rico JA, Seguí-Crespo M. Prevalence of Computer Vision Syndrome and Its Relationship with Ergonomic and Individual Factors in Presbyopic VDT Workers Using Progressive Addition Lenses. Int J Environ Res Public Health. 2020;17(3):1003. doi:10.3390/ijerph17031003 PubMed Web of Science ®Google Scholar

[29] Chu BS, Wood JM, Collins MJ. Effect of presbyopic vision corrections on perceptions of driving difficulty. Eye Contact Lens. 2009;35(3):133–143. doi:10.1097/ICL.0b013e3181a1435e Web of Science ®Google Scholar

[30] Pérez-Prados R, Piñero DP, Pérez-Cambrodí RJ, Madrid-Costa D. Soft multifocal simultaneous image contact lenses: a review. Clin Exp Optometry. 2017;100(2):107–127. doi:10.1111/cxo.12488 Web of Science ®Google Scholar

[31] Bennett ES. Contact lens correction of presbyopia. Clin Exp Optometry. 2008;91(3):265–278. doi:10.1111/j.1444-0938.2007.00242.x PubMed Web of Science ®Google Scholar

[32] Jain S, Arora I, Azar DT. Success of monovision in presbyopes: review of the literature and potential applications to refractive surgery. Surv Ophthalmol. 1996;40(6):491–499. doi:10.1016/S0039-6257(96)82015- Web of Science ®Google Scholar