

# Acupuncture Therapy for the Treatment of Optic Nerve Atrophy

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## Abstract

**Objective:** Optic Nerve Atrophy is one of the most common causes of blindness worldwide. The condition is linked to several pathologies, which contribute to the damage of the optic nerve. The presence of a tumor on the optic nerve, improper formation of the optic nerve, glaucoma, hereditary and central nervous system diseases, and anterior ischemic optic neuropathy promote deterioration of the optic nerve. The purpose of this review is to examine the efficacy of acupuncture therapy for ONA. **Method:** Clinical trials (case control-trials), and randomized control trials (RCTs) were assessed to observe the efficacy of acupuncture as well as the safety of acupuncture, needling manipulation, and acupoints selection. The data collected in this research include scientific research papers from China National Knowledge Infrastructure (CNKI), PUBMED library, National Library of Medicine (NLM), EMBASE, Cochrane Library, Chinese Biomedical Literature Database, and other literature library date present. Ophthalmoscope, OCT, pupils test, ocular alignment, nystagmus, and visual acuity check were the diagnostic tools used for ONA in the included study. ONA treatment has been a challenge to ophthalmologists over the past decades. At present, western approaches have no fixed treatment mechanism for the condition. Early diagnosis, the use of magnifying lenses, and reduction of increased fluid around the spinal cord and brain are the multiple disciplinary approaches used in western medicine for ONA. On the other hand, Acupuncture, a branch of traditional Chinese medicine, which stimulates the body's natural healing ability to promote physical and emotional well-being, has reported some significant treatment effects for ONA. **Result:** The overall result shows that Acupuncture greatly improved patients' visual acuity, visual field, and visual function in the included study. Acupuncture acting alone showed significant superiority over other treatments for optical nerve atrophy. Acupuncture combined with medication could improve a

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patient's condition more rapidly than medications alone. **Conclusion:** Optic nerve atrophy is a threatening condition to the vision, which is a leading cause of blindness worldwide. Acupuncture has improved the condition of patients with ONA more effectively than other treatment mechanisms in the included study. However, more clinical trials need to be carried out to substantiate stronger evidence of acupuncture for ONA.

## Keywords

Acupuncture, Optic Nerve Atrophy, Ophthalmoscope, Visual Acuity

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## 1. Introduction

Optic nerve atrophy (ONA) is one of the most common causes of blindness and low vision worldwide. Optic nerve atrophy appears as a pale disc on the fundus examination. ONA is a condition in which the optical nerve gets damage resulting from several pathologies, such as: presence of tumor on the optic nerve, atherosclerosis of the main vessels of the head, anterior ischemic optic neuropathy, improper formation of the optic nerve, diseases of the central nervous system, glaucoma, inflammatory and vascular diseases of the optic nerve and retina, hereditary diseases, and intoxication of various etiologies. However, early diagnosis of the causative factors is necessary for controlling the condition before treatment options [1]. ONA can also cause irreversible damage to the ganglion cells and the anterior visual pathway, or posterior visual pathway involvement, and could result in a life-threatening condition [2]. In western medicine, treatment is directed to the cause and involves multidisciplinary approaches.

An optical coherence tomography machine is a significant tool in diagnosing ONA. OCT has recently become a vital tool for clinicians and researchers in ophthalmology and, increasingly, in neurology. It is conveniently tolerated by patients, and allows high-resolution viewing of unmyelinated axons and other retinal structures *in vivo* [3]. Optic nerve atrophy can be diagnosed during dilated examination by using an ophthalmoscope; testing pupils, ocular alignment, nystagmus, and visual acuity. For older patients, the assessment of color vision and peripheral vision is needed as well as magnetic resonance imaging (MRI) Scan, visual evoked potential (VEP), optical coherence tomography (OCT), and electroretinography (ERG) may be performed. OCT angiography (OCTA) is a non-invasive, dye-free technology that can image large vessels as well as microvasculature of the retina, and optic nerve head (ONH) by performing multiple OCT scans of the same region [4]. Optic nerve head examination using the OCT facilitates rapid diagnosis of infrequent and hard to distinguish pathological changes, as well as exact monitoring of chronic progressive diseases of the optic nerve. Correct application and evaluation of results gathered using OCT examination of the optic nerve head facilitate accurate diagnosis and correct decisions [5].

## 2. Etiology and Classification of Optical Atrophy

The etiology causing optic nerve atrophy is diverse. One of the most common etiologies of ONA is traumatic optic neuropathy. The exact mechanisms responsible for the optic disc pallor seen in optic atrophy are not clearly elucidated. However, it is assumed that the loss of axonal fibers along with the rearrangement of astrocytes contributes to disc pallor. Optical atrophy can be classified based on various causes, such as: congenital optic neuropathies, which relate to dominant and recessive optic atrophy, Leber's hereditary optic neuropathy, and Behr's hereditary optic atrophy. Vascular disease, Inflammatory disease, Infection, Toxic and nutritional optic neuropathies (Optic atrophy due to toxic or nutritional causes), Trauma to optic nerve, Swollen optic nerve, and Retinal disease such as Retinitis pigmentosa [6]. The risk factors for the development of optic atrophy have been denoted by the mnemonic: VIN DIT'TCH MD. This mnemonic denotes the following conditions = V: Vascular; I: Inflammatory and infectious; N: Neoplastic or compressive; D: Primary demyelinating disease or idiopathic optic neuritis; T (2): Toxic and traumatic; C: Congenital; H: Hereditary; M: Metabolic and endocrine causes; D: Degenerative [7].

## 3. Types of Optical Atrophy

Some types of optical atrophy include; primary optical atrophy, secondary optical atrophy, consecutive optic atrophy, and glaucomatous optic atrophy. Based upon clinical study;

1) Primary optic atrophy is present without any form of swelling of the optic nerve head but the disc appears pale and chalky-white due to cupping and visibility of the lamina cribrosa and the axon degenerate in an orderly manner. Optic nerve tumors, aneurysms, hereditary, traumatic-optic neuropathies, and carrying on with retro-bulbar neuritis to multiple sclerosis are associated with its etiology. Lesions cause this condition in the anterior visual system extending from the RGCs to the lateral geniculate body (LGB).

2) In secondary optic atrophy, swelling occurs and the optic nerve head architecture is lost. In addition, the optical disc margins become blurred, with a grey or dirty-grey disc color. In this condition, the lamina cribrosa is not visible due to the filling of the cup by overlying proliferative fibroglial tissue.

3) Consecutive optic atrophy, the optic nerve head is waxy pale with a normal disc margin, marked attenuation of arteries, and a normal physiologic cup. This condition is associated with diseases that affect the inner retina or its blood supply, such as: retinitis pigmentosa, pathological myopia, pan-retinal photocoagulation, extensive retinochoroiditis, and central retinal artery occlusion.

4) Glaucomatous optic atrophy is characterized by specific vascular changes in the optic disc, such as an increase in the cup: disc ratio and changes in the blood vessels as well as thinning of surrounding retina nerve fiber layer (RNFL) [8]. Occipital lesions have been reported to cause bilateral optic atrophy. Optical nerve lesion can also be asymptomatic. Asymptomatic lesions are associated with thin-

ner inner retinal layers and are an underestimated and preponderant cause of retinal neuro-axonal loss in multiple sclerosis [9]. Drugs used in the treatment of multiple sclerosis, such as corticosteroids and fingolimod can cause decreased vision due to central serous and cystoid macular edema sometimes confused with recurrent optic neuritis. A subset of patients with various types of optic atrophy show microcytic changes in the inner nuclear layer on spectral domain OCT imaging. Optical coherence tomography (OCT) of the macula in patients with primary optic neuropathy has revealed the presence of structural changes in the neurosensory retina in addition to the nerve fiber layer.

#### **4. Clinical Description of Optical Atrophy**

Patients who develop optic atrophy may explain to their ophthalmologist during presentation of chief complain the occurrence of vision loss, blurred vision, or difficulties with color vision. The ophthalmologist will then inquire the history of the patient case such as nature of the condition, family history of any form of visual complication, medical or surgical history, history of diabetes, alcohol and drug addiction, trauma, past medication history etc. If optic atrophy is suspected in the patient's clinical presentation, with an ophthalmoscope the ophthalmologist will observe the optic disc. The patient will sit in an upright position, face pointed forward; the ophthalmologist will place the ophthalmoscope closer to the patient's eye to have an essential look at the point residing in the back of the eye where the optic nerve ends. When light is shown on the fundus from a light source, it undergoes total internal reflection through the axonal fibers. Subsequently, reflection from the capillaries on the disc surface gives rise to a yellow-pink color, which signifies a healthy optic disc. If the patient has cataract the optic disc will be shown as a red color, while with optic atrophy, the optical disc color will be seen as pale due to the changes in blood flow in the vessels. The ophthalmologist will also conduct other test to check the vision. Visual field changes can include enlargement of the blind spot and paracentral scotoma. Magnetic resonance imaging should also be carryout during examination of ONA, as imaging techniques helps demonstrate space-occupying lesions, sinusitis, hyperpneumatized sinuses, fibrous dysplasia, and fractures. Follow by an OCT, as OCT demonstrates the thinning of the retinal nerve fiber layer, blood pressure examination and to check for other cardiovascular findings. Other examination that should be considered during dilated examination include: testing pupils, ocular alignment, nystagmus. For older patients, the assessment of color vision and peripheral vision is needed as well as magnetic resonance imaging (MRI) Scan, visual evoked potential (VEP), and electroretinography (ERG) may be perform. Optic atrophy is the end stage of a disease process affecting the retinogeniculate portion of the visual pathway, characterized by a non-specific sign of optic disc pallor. While the peripheral nervous system has an intrinsic ability for repair and regeneration, the central nervous system, for the most part, is incapable of such processes. The axons of the optic nerve are heavily myelinated by

oligodendrocytes and reactive astrocytes, which express many inhibitory factors for axonal regeneration [10].

## 5. Dominant Optic Atrophy

Dominant Optic Atrophy (DOA) is a neuro-ophthalmic condition characterized by a bilateral degeneration of the optic nerves, which result to insidious visual loss, that begin early as the first decade of life [11]. This condition affects the retinal ganglion cells (RGC) and their axons forming the optic nerve, that allows the transfer of visual information from the photoreceptors to the lateral geniculus in the brain [12]. The visual acuity of patients with DOA ranges from normal to legal blindness. The ophthalmic examination discloses on fundoscopy isolated optic disc pallor or atrophy, related to the RGC death. About 20% of DOA patients harbor extraocular multi-systemic features, including neurosensory hearing loss, or less commonly chronic progressive external ophthalmoplegia, myopathy, peripheral neuropathy, multiple sclerosis-like illness, spastic paraplegia or cataracts. There are different diagnostic mechanisms to determine dominant optic atrophy, such as: causes of bilateral optic neuropathies, *i.e.* compressive, inflammatory, demyelinating, ischemic, glaucomatous, toxic, and metabolic optic neuropathies. Of all these differential diagnosis of DOA, normal tension glaucoma (NTG) which occurs during late adulthood without showing loss of central visual until later stage of the condition may present with signs consistent with DOA, such as visual field defects and optic disc excavation [13]. DOA starts during childhood and evolves to poor vision or legal blindness, affecting the central vision, whilst sparing the peripheral visual field [14]. The histopathological hallmark of DOA is the primary degeneration of retinal ganglion cells, preferentially in the papillomacular bundle, which results temporal optic disc pallor and centro-central scotomata in patients with DOA [15].

## 6. Leber's Hereditary Optic Neuropathy

Leber's hereditary optic neuropathy (LHON) is an inherited form of vision loss. The condition typically affects young adults with a higher prevalence in men, but can ultimately occur at any age and also in women. LHON is caused by point mutations in the mitochondrial DNA, which lead to a defect in complex I of the mitochondrial respiratory chain. This in turn causes dysfunction and later degeneration of retinal ganglion cells, followed by ascending optic atrophy. Classically, LHON presents as a subacute unilateral loss of visual acuity, dyschromatopsia in the red-green axis and a central or centrocecal scotoma. The partner eye usually develops similar symptoms within 3 - 6 months of onset of the disease [16]. Blurring and cloudy are among the first symptoms of LHON follow by vision loss, tremors, movement disorders, and abnormalities of the cardiac conduction defects. In some cases, individual may develop likely features as multiple sclerosis, a chronic disorder characterized by numbness, weakness and variety of other health problems. Vision loss is typically the only symptom of LHON. Not-

withstanding, there are still some patients with additional signs and symptoms which can be describe as LHON plus [17]. Neurologic abnormalities such as: postural tremor, peripheral neuropathy, nonspecific myopathy, and movement disorders have been reported to be more common in individuals with LHON. Males are more likely to be affected than females; nevertheless, neither sex nor mutational status significantly influences the timing and severity of the initial visual loss [18].

## 7. Treatment Perplex

Optical Nerve Atrophy is one of the most common causes of blindness worldwide. At present, western approaches has no fixed treatment mechanism for this condition of ONA. In western medicine, to treat optical nerve atrophy, treatment is directed to the cause of disease and involves multiple disciplinary approaches, including early diagnosis, the use of magnifying lenses and reduction of increased fluid around the spinal cord and brain. Therefore, the condition is treated only by discovering the underlying disease associated with ONA to be treated and to prevent continuous vision loss because damage from the optic nerve atrophy cannot be reversed. When optic atrophy is unilateral, protection of the good eye is essential and wearing of protective lenses should be stressed. A child with ONA may have significantly reduced vision and thus need special assistance for school. To help aid this child in school, parents would need to inform tutors to induce a personalized learning plan for the child that is convenient for them in order to facilitate a maximal learning experience [19]. There is currently no proven treatment for LHON or DOA [20]. Notwithstanding, Rax-one (idebenone) is the only available medicinal product authorized to treat LHON within the European Union to control this condition, yet, LHON remains an unmet medical need [21]. Regardless of these treatments perplex of ONA, studies shows that acupuncture has some significance as a non-drug treatment of optic nerve atrophy.

## 8. History and Significance of Acupuncture for ONA

Acupuncture has been practiced in China for more than 3000 years and was spread to Europe and American from the sixteenth to the nineteenth century. [22]. Acupuncture comprises of theories like jing mai, qi xue and technical factors like moxibustion. The word “zhen jiu”, in Chinese translated as “acupuncture and moxibustion”, means there was a way to reconcile two techniques. With the method of reconciling the two techniques, clinical diagnosis and treatment were classified in two forms. The first encompasses change in patient’s condition before and after treatment, syndrome differentiation, and examination of the four TCM diagnostic methods; “observation, auscultation and olfaction, inquiry and pulse feeling and palpation”. The second method involves treatment based on the characteristics of different interventions. Namely; evaluating acupuncture by the “arrival of *qi*” “getting *qi*”; evaluating pricking collaterals-bloodletting

therapy by the color of blood; evaluating moxibustion by the skin color and the feeling on the suppurated sore [23] [24].

Traditional Chinese Medical theory has a unique system of treatment. Acupuncture that is a branch of TCM has the capacity to stimulate the body natural healing ability to promote physical and emotional well-being. With this being said, previous studies have reported that Acupuncture as a branch of traditional Chinese medicine may be effective for treatment of ONA. In addition, several studies have reported that acupuncture shows effectiveness in visual acuity improvement, improvement in visual field and visual function and its superiority over other treatment for optical nerve atrophy. Therefore, it is expected that acupuncture should have a more successful treatment effect for the condition of ONA than other treatment mechanisms, which could serve as a beacon of hope in ophthalmology studies to be one of the most significant first line treatment for the control of optic nerve atrophy [25]. Acupuncture also treats several other eye diseases such as glaucoma. Although there are available treatment options to manage glaucoma, however, some patients may seek complementary or alternative medicine approaches such as acupuncture to supplement their regular treatment [26]. According to Professor Zhang Ren clinical experience, stagnation of *qi* and blood in the eyes, obstruction of *xuanfu* in the eyes, and obstruction of meridians are the key pathogenesis of glaucoma. He mentioned that the treatment for glaucoma should focus on the eye, with smoothing the liver and keeping functional state of six-*fu* as a priority. He also emphasizes that acupoints selection is based on the combination of disease differentiation and syndrome differentiation, and be conscious of the application method of promoting *qi* circulation and inducing *qi* movement [27].

### 8.1. Acupuncture Compare with Medication for ONA

There are several studies that has shown comparable mechanism of acupuncture for treating optical nerve atrophy, compare with other medications. In this review, several articles were examined to extract the importance of acupuncture therapeutic effect for ONA compare to medication alone. One study reported showing result for Manuel acupuncture compare with medication alone for treatment of optic atrophy indicated a significant differences in favor of manual acupuncture compared with medication. The following outcome measures were as follows; Visual acuity (MD = 0.18, 95% CI [0.17, 0.20],  $P < 0.00001$ ). The mean sensitivity of visual field indicated (MD = 2.11, 95% CI [1.90, 2.32],  $P < 0.00001$ ), The latent period of P-VEP100 (MD = -6.80, 95% CI [-8.94, -4.66],  $P < 0.00001$ ), The total effectiveness (264 eyes) (OR = 3.22, 95% CI [1.88, 5.51],  $P < 0.0001$ ), and the total effectiveness (344 participants) (OR = 4.29, 95% CI [2.56, 7.19],  $P < 0.00001$ ). Another study containing Thirteen RCTs involving 1180 eyes in an included study meta-analyses showed that the effect of acupuncture or combined with medicine shows superiority to medicine alone. In terms of total effectiveness the overall result were [OR = 3.281, 95% CI (2.517, 4.278)], visual acuity [3.287, 95% CI (2.193, 4.925)], and visual field [3.215, 95%



CI (1.580, 6.543)] [28] [29]. The vision increasing rate was 75.76% in the observation group and 56.67% in the control group, with a significant difference before and after treatment in the observation group ( $P < 0.05$ ) and no significant difference in the control group ( $P > 0.05$ ), and with significant difference between the two groups ( $P < 0.001$ ) [30]. Acupuncture is superior to medicine in terms of improved visual acuity, visual field and P-VEP. Acupuncture can improve the visual function of patients with optic atrophy, and can be an effective therapy. Acupuncture also combined with medications than medication alone shows great effectiveness for optic atrophy.

## 8.2. Selection of Acupoints for ONA

Selection of acupoints is very cardinal for treating diseases. Every acupoint in the body is connected to an internal organ; therefore, stimulation of an acupoint immediately notifies the connected internal organ chi to activate for natural healing purposes. As the eye is one of the most important organs on the human body, it requires carefulness due to its sensitivity of nerves and blood vessels. In several studies, the acupoints selected to treat optical nerve atrophy included local points combined with points selected according to syndrome differentiation. The main points in the included studies were; Jingming (BL 1), Cuanzhu (BL 2), and Fengchi (GB 20). After two courses of treatment, the therapeutic effects were evaluated, and variation of the indexes in patients such as vision, visual field and visual evoked potential were observed before and after treatment and acupuncture showed a great treatment effect on patients in all included studies [31]. Another study containing 33 participants with optic atrophy treated with acupuncture on selected acupoints such as: Chengqi (ST 1), Shangjingming (Extra), Qiuhou (EX-HN 7) and Fengchi (GB 20), retaining needles after 30, once a day, for 14 days result shows that, the visual acuity was increased ( $P < 0.05$ ), the MD value was decreased ( $P < 0.05$ ), the thickness of nerve fiber layer on the upper temporal side of optic disc was thinner ( $P < 0.05$ ), and the choroidal thickness of average, nasal side and lower temporal side of optic disc was increased ( $P < 0.05$ ) as compared before treatment. The visual acuity, intraocular pressure, visual field indexes (mean deviation [MD], pattern standard deviation [PSD] and visual field index [VFI]), optic disc retinal nerve fiber layer thickness, macular retinal thickness and choroidal thickness of optic disc and sub-foveal were compared before and after treatment. There was significant correlation between visual field MD and retinal nerve fiber layer thickness in different quadrants before and after treatment ( $P < 0.01$ ). With the selection of the right acupoints during treatment, and the regularity of acupuncture session, acupuncture could improve visual acuity, increase choroidal thickness in part of optic disc area in patients with optic atrophy [32].

## 8.3. Needling Manipulation for ONA

There are several needling manipulations for insertion of needles during acupuncture. However, when it comes to the eye needling is slightly emphasized



with caution as compare to other body parts. Improper needling of acupoints around the eye may lead to adverse effects such as bleeding of blood vessels. Notwithstanding, the “three eye-needling” technique is one of the important component of *Jin’s* three needling therapy, that is mainly used for the treatment of eye disorders such as optic atrophy. This technique is particularly for “mind regulation”, focusing on tranquilizing, observing and concentrating the mind. The precise selection of point is the basic requirement, the technique for fixing; pressing and pricking are the extremely important. In terms of acupuncture operation, skin stretching, patient’s attention shifting, quick insertion of needle and slow-down moving of needle body are required. The outside orbit transverse needling method is important and needle insertion with one hand is adopted. In the insertion of needle, professor Peng stressed on the stability, accuracy and fast, without lifting, thrusting, rotating, and opening/closing techniques involved. Tian Weizhu emphasizes the gentle insertion, pain avoiding, apparent needling sensation and needling sensation transmission. As it relates to Mind regulation, point selection and specific operation are coordinated with each other to bring the function of “three eye-needling” technique into play and achieve better therapeutic effects [33] [34].

Dating back on history involving the use of acupuncture for eye diseases, between 1954 to 2016, researches was conducted on acupuncture for ophthalmopathy. The aim of this study was to reflect the spectrum and indication of the disease. The spectrum of the disease of acupuncture for ophthalmopathy contained about 47 diseases. In this research, the figures of cases were 176,469, while the effective cases were 160,662, and effective rate of 91.0%. Commonly used indications were strabismus, dry eye and ophthalmoplegia, and the secondary indications were optic atrophy, blepharoptosis, oculomotor paralysis, blepharospasm, amblyopia. Acupoints selected included Cuanzhu (BL 2), Jingming (BL 1), Taiyang (EX-HN 5), as the most commonly used acupoints, with yan (LO<sub>5</sub>), gan (CO<sub>12</sub>) and shen (CO<sub>10</sub>) serving as auricular points. To assist in the treatment effectiveness, the combination of both local and distal points was selected to achieve an excellent result [35].

## 9. Wei’s Triple Nine Needling Therapy

In Wei’s Academic school of ophthalmology, Wei’s triple nine needling therapy” is a significant method of acupuncture in treatment of eye diseases. This style of needling therapy encompass the three points near to the eyes, the three groups of points for penetrating acupuncture around the eyes and the acupoint selection based on syndrome differentiation. The acupoint selection and combination of acupoint analysis were initiated in the treatment of optic nerve disease on the basis of the theory of Wei’s triple nine needling” prescription. It is recommended that combination of acupoints and the correct needling manipulations must be selected logically in concession with the condition of illness as well as the syndrome differentiation to ultimately verify the clinical effects of Wei’s triple

nine needling therapy". In regards to Wei's triple nine needling prescription, a study conducted containing 90 patients with optic atrophy were randomly arranged into observation group and a control group with a total of 45 cases in each group. The cases included in the observation group were treated with combination therapy of Wei's triple nine needling prescription along with conventional medication. While, only conventional medication was given in the control group. The duration of treatment in each group lasted for 4 weeks. The visual field of each eye was observed before treatment commences and after the first 2 weeks of treatment process, on to the 4<sup>th</sup> week of the final treatment. The clinical efficacy was evaluated in both groups. The overall result was in favor of the observation group over the control group. The total effective rate is as indicated below in figures. Effective rate in the observation group was 57.8% (26/45) while in the effective rate in the control group was 28.9% (13/45), ( $P < 0.05$ ). The visual acuity was improved ( $P < 0.01$ ), after 2 week and 4 weeks of treatment. The mean defect (MD) of visual field was decreased ( $P < 0.01$ ), the mean sensitivity (MS) of visual field was increased in the observation group ( $P < 0.05$ ,  $P < 0.01$ ). After 2-week and 4-week treatment, the visual acuity and the MD of visual field were improved ( $P < 0.01$ ,  $P < 0.05$ ), while the difference of MS of visual field compared before treatment had no statistical significance in the control group ( $P > 0.05$ ). The improvement of visual acuity, MD and MS of visual field after 2-weeks and 4-weeks into treatment in the observation group were superior to those in the control group ( $P < 0.05$ ,  $P < 0.01$ ). In this study, Wei's triple nine needling significantly improved the visual acuity and the defect of visual field in patients with optic atrophy [36].

## 10. Dry Needling Versus Acupuncture

Acupuncture have been used over thousands of years ago to treat various eye diseases, relieve pain, stimulate chi and promote blood circulation. Dry needling on the other hand is a modern treatment design to reduce muscular pain. Apart from the treatment of eye diseases, acupuncture is able to treat several diseases associated with the Zang-Fu organs. Dry needling has different form of needle insertion such as techniques called pistoning or sparrow pecking just as acupuncture has different styles of manipulation based on different body parts. In dry needling, the needles don't stay inserted in the skin for long unlike acupuncture. Acupuncture has various techniques of needle manipulation as studied compare to dry needling. Some acupuncture needling techniques include: lifting and thrusting manipulation, oblique insertion, perpendicular needling insertion and so on. In the United States and other Western countries, dry needling has been a topic in academic and legal fields. Dry needling have been promoted simply by rebranding 1) acupuncture as dry needling and 2) acupuncture points as trigger points (dry needling points). It is adopted that dry needling uses more of biomedical terms than the actual Chinese medical terms. However, dry needling works in concurrence with acupuncture significant aim.

It is derived from the branch of traditional Chinese medicine acupuncture. In dry needling manipulation, the trigger point is simple in relations with the category of Ashi point in TCM. By applying acupuncture points, dry needling is actually trigger point acupuncture, an invasive therapy (a surgical procedure) instead of manual therapy. Overall, dry needling is recognized as acupuncture, it is just a subtype of needling under the acupuncture manipulation. During some acupuncture session, based on patient's disease or condition, acupuncturist carried out dry needling as acupuncture therapy [37].

## 11. Discussion

Optical nerve atrophy is a common cause of blindness worldwide. The condition has been under-treated for decades and its treatment poses a challenge to ophthalmologist. Presently there is no cure for optical atrophy, as though the atrophy cannot be reversed once it occurred. Treatment of optical atrophy is directed to the cause of the underlying disease and involves a multidisciplinary approach. The first step in controlling this condition is by diagnosing the condition. The use of ophthalmoscope, optical coherence tomography (OCT), visual field examination, color and peripheral check, pupil testing, nystagmus, and ocular alignment help in diagnosis during dilated examination. One of the most common etiologies of optic nerve atrophy is traumatic optic neuropathy. Optical atrophy can be classified based on several causes such as: congenital optic neuropathy that includes dominant and recessive optic atrophy, Leber's hereditary optic neuropathy, and Behr's hereditary optic atrophy. Other causes include; vascular disease, inflammatory disease, infection, toxic and nutritional optic neuropathies, optic nerve trauma, swollen optic nerve, and retinal diseases. Optical atrophy can also be separated into various types, namely; primary optic atrophy, secondary optic atrophy, consecutive optic atrophy, and glaucomatous optic atrophy. Optical nerve lesion can be asymptomatic which is associated with thinner inner retinal layers and is a preponderant cause of retinal neuro-axonal loss in multiple sclerosis. Dominant optic atrophy is characterized by the degeneration of the optic nerve which results in insidious visual loss that begins in the early decade of life which affects the retinal ganglion cells and their axons forming the optic nerve that allows the transfer of visual information from the photoreceptors to the lateral geniculus in the brain and the visual acuity of patient in DOA ranges from normal to legal blindness. There are several diagnostic mechanisms to determine DOA. These include; bilateral optic neuropathies, *i.e.* compressive, inflammatory, demyelinating, ischemic, glaucomatous, toxin, and metabolic optic neuropathies. At present, there is no cure for optic atrophy. In western medicine, the treatment of ONA is directed to the cause of the disease and requires multiple approaches such as: early diagnosis, the use of magnifying lenses, and reduction of increased fluid around the spinal cord and brain, therefore the condition is only controlled by treating the underlying diseases associated with the condition. When optic atrophy is unilateral, protec-

tion of the good eye is very cardinal for the patient's vision sustainability. Despite the perplex of treatment to control optic nerve atrophy, a branch of Traditional Chinese Medicine, (Acupuncture) has reported in many studies its effective mechanism for treatments of ONA that has shown vast effect than other treatment methods. Acupuncture has been reported to improve visual acuity, visual field, visual function, and superiority over other treatments for ONA. Acupoints selected to treat optic atrophy in the included studies were local points combined with points selected according to syndrome differentiation. These points include Jingming (BL 1), Cuanzhu (BL 2), and Fengchi (GB 20) as the main selected points. Other acupoints selected were Chengqi (ST 1), Shangjingming (Extra), and Qiuhou (EX-HN 7). After two courses of treatment, the therapeutic effects were evaluated, and variations of the indexes in patients such as vision, visual field, and visual evoked potential were observed before and after treatment and acupuncture showed a great treatment effect on patients in all included studies. Acupuncture was also combined with other medications to treat ONA and it still showed a significant improvement in patient's vision than medication alone. One of the main acupuncture needling techniques adopted in this study was Wei's triple nine needling therapy. Acupuncture has shown a promising effect in the treatment of optical nerve atrophy and it can also be emphasized as a beacon of hope against the threatening loss of vision for ONA patients.

## 12. Conclusion

Optical Nerve Atrophy is a condition in which the optical nerve gets damaged resulting in several pathologies. The condition is one of the most common causes of blindness and low vision worldwide. Presently, there is no cure for reversing the atrophy once it occurs. Despite the perplex of treatment, acupuncture has shown significant improvement in visual acuity, visual field, and visual function of patients with ONA in the included study. Notwithstanding, more clinical trials need to be carried out to substantiate stronger evidence of acupuncture treatment for optical nerve atrophy.

## 13. Prospect

It is expected that with the promising report of the significance of acupuncture in the included study, acupuncture should serve as a beacon of hope for optical nerve atrophy sufferers. Furthermore, currently, there is no cure for removing the atrophy, but with the current progress of acupuncture treatment for ONA, we are hopeful that as more research is being conducted in the field of Acupuncture for ONA, acupuncture may serve as a first-line treatment for ONA, aiding success in the improvement of patient's vision in the future. Lastly, it is the fervent hope of the researchers to see the usage of acupuncture and Traditional Chinese Medicine being maximized and adopted in other parts of the world.

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## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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## Abbreviation

ONA: Optic Nerve Atrophy

MD: Mean Deviation

CI: Confidence Interval

OCT: Optical Coherence Tomography

MRI: Magnetic Resonance Imaging

MS: Mean Sensitivity

ERG: Electroretinography

VEP: Visual Evoked Potential

RGC: Retinal Ganglion Cells

PSD: Pattern Standard Deviation

VIF: Visual Field Index