ORIGINAL RESEARCH REPORT

Autoimmune Optic Neuropathy (AON) Profile at Ophthalmology Outpatient Clinic of a Tertiary Hospital in Surabaya, Indonesia

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ABSTRACT

Background: Autoimmune optic neuropathy (AON) is a kind of optic neuritis that causes progressive and severe vision loss. The presence of an autoimmune disease usually characterizes the diagnosis of this disease. Several autoimmune processes that can cause AON are Multiple Sclerosis (MS), Neuromyelitis Optica Spectrum Disorder (NMOSD), Myelin Oligodendrocyte Glycoprotein Immunoglobulin (MOG-IgG), and other disorders, specifically systemic autoimmune disease, such as Systemic Lupus Erythematous (SLE), Sjogren's Syndrome, and Sarcoidosis. Risk factors for AON involve young adults and women. Most of the patients received therapy according to the ONTT protocol and underwent outpatient treatment with oral methylprednisolone or prednisone. **Objective:** The study aimed to obtain the autoimmune optic neuropathy (AON) profile in patients at the Ophthalmology Outpatient Installation of Dr. Soetomo General Academic Hospital Surabaya, Indonesia, in the 2017-2022 period. **Material and Method:** This retrospective descriptive study used medical records; 70 subjects were included. **Result:** Most subjects suffered from SLE (55.7%) as the cause of AON and received therapy according to the ONTT protocol, namely oral methylprednisolone or prednisone (67.1%) with outpatient therapy. Some patients were given other therapies (25.7%), such as mecobalamin and other B complex vitamins. **Conclusion:** AON is an uncommon condition. However, if not treated promptly and effectively, it can result in handicaps. This study may serve as a reference for future relevant research and as an attempt to prevent the disease.

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Highlights

1. Autoimmune optic neuropathy (AON) is one of the diseases that involve the central nervous system (CNS) and can result in disability if not treated quickly and appropriately.
2. The autoimmune optic neuropathy (AON) patient's profile, including disease etiology and therapy, is essential to minimize the incidence of AON.

BACKGROUND

Optic neuritis (ON) is a clinical symptom of central nervous system inflammation. This condition can affect people of all ages, from children to adulthood (Bennett, 2019). The main characteristics of ON included acute, unilateral, and painful vision loss. In patients with ON, visual acuity can recover within two to three weeks, with nearly total recovery taking approximately five weeks. This condition mostly affects women in around 75% of instances (García Ortega, et al., 2020). Autoimmune optic neuropathy (AON) is a component of optic neuritis characterized by progressive and possibly severe visual impairment (Bandoli & Moura, 2022). The most common case related to AON is multiple sclerosis (MS), which has a global frequency that has risen to 2 million cases. ON is a clinical symptom that affects 70% of multiple sclerosis (MS) patients, with a higher prevalence in women (Glover, et al., 2021). MS is a typical optic neuritis characterized by acute, unilateral, and demyelinating optic neuritis (Abel, et al., 2019).

Some autoimmune processes that can cause AON are multiple sclerosis (MS), neuromyelitis optica spectrum disorder (NMOSD), myelin oligodendrocyte glycoprotein immunoglobulin (MOG- IgG), and other disorders such as systemic autoimmune (Vanikieti, et al., 2020). The manifestation of optic neuritis (ON) can be classified into two overarching categories: typical and atypical optic neuritis. Typical optic neuritis is frequently associated with multiple sclerosis and is an idiopathic demyelinating disorder. This has been thoroughly characterized, and the prognosis is outstanding. An inflammatory, viral, or autoimmune condition can cause atypical optic neuritis (Abel, et al., 2019).

AON instances should be treated promptly despite this condition being uncommon and seldom encountered. AON has the potential to result in impairment. An efficient and appropriate treatment procedure can enhance the quality of life for individuals experiencing symptoms. Thus, the preferred treatment for this disease is to adhere to the optic neuritis treatment trial (ONTT) (Frohman, et al., 2009). The primary therapy suggested is administering a combination of intravenous methylprednisolone followed by prednisone or oral methylprednisolone at a recommended dose per the procedure. Furthermore, the use of methylprednisolone or prednisone taken orally, intravenous methylprednisolone, and other supportive treatments such as vitamin B12 and other B-complex vitamins might also be considered as therapy choices for patients with AON (Anand, 2019).

OBJECTIVE

The general objective of this study was to analyze the characteristics of autoimmune optic neuropathy (AON) in patients at the Ophthalmology Outpatient Department of a tertiary hospital, Dr. Soetomo General Academic Hospital, Surabaya, Indonesia, from 2017 to 2022. This was done by examining the distribution of patients according to the cause of the disease and the treatment they received, following the ONTT protocol.

MATERIAL AND METHOD

The data for this study were collected from the medical records of patients at the Ophthalmology Outpatient Department of Dr. Soetomo General Academic Hospital in Surabaya. This study utilized a retrospective approach, including data collected from medical records of individuals with autoimmune optic neuropathy (AON).

The inclusion criteria included all patients diagnosed with AON by neuro-ophthalmology specialists. Additionally, some patients were referred from the Neurology and Internal Medicine Departments at Dr. Soetomo General Academic Hospital, Surabaya, between 2017 and 2022. The exclusion criteria included incomplete medical records that needed more data for this investigation, such as information on the underlying causes of autoimmune illnesses leading to AON and the treatment provided to these individuals.

The ethics committee issued an ethical clearance letter for research and fundamental or clinical sciences of Dr. Soetomo General Hospital Surabaya before accessing medical records data. In addition, the medical records of patients with AON who received treatment at the Ophthalmology Outpatient Department of Dr. Soetomo General Hospital Surabaya from 2017 to 2022 were collected. The acquired data were processed and categorized based on the criteria. Then, the data were analyzed descriptively using the IBM SPSS Statistics for Mac, version 25.0 (IBM Corp., Armonk, N.Y., USA)., employing frequency analysis, and displayed in table format.

RESULT

The findings of this study indicated that there was a disease cause that contributed to the development of autoimmune optic neuropathy (AON). According to Table 1, most patients affected by AON at the ophthalmology outpatient facility of Dr. Soetomo General Hospital Surabaya from 2017 to 2022 had systemic lupus erythematosus (SLE), with 39 subjects (55.7%). This was followed by multiple sclerosis (MS) with 21 subjects (30.0%), neuromyelitis optica spectrum disorder (NMOSD) with nine subjects (12.9%), and Sjögren's syndrome (SS) with only one subject (1.4%).

Table 1. Distribution of AON patients based on disease etiology at Dr. Soetomo General Academic Hospital Surabaya, Indonesia, from 2017 to 2022.

Disease etiology of AON patients	n	%
SLE	39	55.7
MS	21	30
NMOSD	9	12.9
SS	1	1.4
Mog-IgG	0	0
Sarcoidosis	0	0

This research also discussed the therapies that AON patients may receive. Most of the patients were given methylprednisolone or prednisone orally as many as 47 subjects (67.1%). AON patient therapies can be seen in Table 2.

Table 2. AON patient therapies at Dr. Soetomo General Academic Hospital Surabaya, Indonesia.

AON patient therapies	N	%
IV-MP	1	1.4
Oral MP or prednisone	47	67.1
IV-MP and oral MP prednisone	4	5.7
Other therapies	18	25.7

It was found that the distribution of the outpatients receiving treatment with oral methylprednisolone or prednisone was as many as 47 subjects (72.3%).

Table 3. Cross-distribution between treatment and therapy, according to ONTT protocol in AON patients.

AON patient's treatment	Therapies				Total
	Oral MP/ prednisone	Oral MP + IV	IV-MP	Other therapies	
Outpatient	47 (72.3%)	0 (0.0%)	0 (0.0%)	18 (27.7%)	65 (100%)
Hospitalization	0 (0.0%)	4 (80%)	1 (20%)	0 (0.0%)	5 (100%)

DISCUSSION

Distribution of AON patients based on disease etiology

The majority of the participants in this study were individuals who had SLE autoimmune illness, which differed from those found in a previous study by Petzold & Plant, (2014), which showed that optic neuritis (ON) is a symptom that occurs in multiple sclerosis (MS) and also demonstrated that the connection between MS and ON is less common in Asian compared to Caucasian patients. Another study by Bennett (2019) also said that optic neuritis impacts around 70% of individuals with MS. This study also noted that only a few SLE patients experience visual neuritis. Patients with systemic lupus erythematosus (SLE) who experience optic neuritis typically have a severe condition and do not fully recover.

Another study by Shoughy & Tabbara, (2016) also stated that optic neuritis only occurred in 1% of SLE patients. The difference in the cause of autoimmune illness connected to ON in this study and earlier studies may be because few investigations have been completed in Southeast Asia, particularly Indonesia. The few existing studies were mainly conducted in Caucasian countries. One study suggests that MS linked to ON is more prevalent in individuals residing in regions with higher latitudes like North America, Europe, Australia, etc. This is due to the connection between lower vitamin D levels and the risk of MS. Areas with higher latitudes may receive inadequate sun exposure, this is one of the important reasons decreasing vitamin D levels (Durmaz, et al., 2020). According to Paramita & Louisa (2017), there is a reduced risk of relapse in MS patients who have taken vitamin D supplementation compared to patients who have not given vitamin D.

A study by Zahid & Iqbal, (2019) found that the prevalence of SLE is elevated in individuals of Asian descent. Another research by Fatima, et al., (2021) reported that the most common cause of ocular neuritis was an autoimmune disorder called SLE. The occurrence of optic neuritis in SLE illness is generally uncommon. Nevertheless, it can manifest with symptoms such as severe vision loss and pain in the eye that worsens with movement and is usually unilateral (Dammacco, 2018). Conditions including systemic lupus erythematosus (SLE), Sjogren's syndrome, and sarcoidosis can cause ocular neuritis as a symptom. The optic nerve may be involved in these circumstances due to immune-mediated or vasculitis that can result in optic nerve ischemia (Phuljhele, et al., 2021).

Distribution of AON patients by therapy according to Optic Neuritis Treatment Trial (ONTT)

Most individuals in this trial received oral methylprednisolone or prednisone treatment, which was gradually reduced. The ONTT regimen is administered by gradually decreasing the amount of the medicine before stopping it completely. This is done to prevent the danger of mortality that might occur if steroids are abruptly discontinued (Tajfirouz, et al., 2019). The findings of this study did not show significant improvements in patients who received intravenous methylprednisolone following the ONTT protocol, as reported by Lassie & Hartono, (2020). However, the study suggests that intravenous methylprednisolone may be a potential treatment option for patients with severely impaired vision, as it could lead to faster recovery of visual acuity in the early stages. Nevertheless, research conducted by Dahanayake, et al., (2021) argued that randomized control trials provide evidence supporting the use of oral corticosteroids as a potential alternative or replacement for intravenous corticosteroid treatment.

Another study, however, contradicted the findings of this study, such as the study carried out by Fatima, et al., (2021), which indicated that the majority of patients received intravenous

methylprednisolone (250 mg) every 6 hours for three days, followed by oral prednisone 1 mg/day for 11 days—the result of treatment with this method. In the final control, most samples had visus within the normal range of 6/6-6/18 and there were no samples with LP visus. This treatment regimen is considered the most recommended therapy according to the ONTT protocol.

According to Wilhelm & Schabet, (2015), using intravenous methylprednisolone (500-1000 mg/day) for 3-5 days at the early stage of therapy leads to quicker vision recovery but does not enhance visual acuity. However, Chen et al (2020) said that intravenous methylprednisolone is the initial treatment for acute ocular neuritis.

The majority of the patients in this research received oral methylprednisolone since most of the patients with AON were treated as outpatients, and only a small number of patients were referred for hospitalization, while intravenous therapy necessitated hospitalization. Moreover, giving medication by mouth is recommended and is not difficult for the patients, particularly those distant from healthcare facilities. Research conducted by Morrow, et al., (2018) suggested that oral therapy was cost-effective and more convenient for patients.

Some patients received other therapies. Usually, patients are given Vitamin B12 (mecobalamin) or other B complex vitamins such as B1 or B6; some are combined with folic acid. Some patients are also treated with corticosteroids, vitamin B complex, and folic acid. Based on a study conducted by Anand (2019), a treatment combining vitamin B12 and folic acid can potentially treat optic neuritis.

According to Morrow & Ko, (2017), their systematic analysis found that specific individuals received therapy only with oral prednisone treatment. The use of low-dose oral prednisone alone was found to have a significant risk of recurrent optic neuritis. Meanwhile, taking methylprednisolone by mouth led to temporary improvement in vision.

Strength and limitations

This study was conducted retrospectively. The limitation of retrospective research is that all data can only be taken from pre-existing data, whereas not all data needed in the survey are available wholly and correctly. The benefit of this study was that it focused on a rarely discussed topic, particularly in Indonesia. As a result, finding information and references about AON disease took much work. This research aims to serve as a reference for future studies on AON and provide additional information for the community and healthcare professionals.

CONCLUSION

The distribution of disease etiology in this study was mostly SLE. This finding differed from many other studies where MS was shown to be the primary cause of the common autoimmune disease of AON. However, in this study, MS was classified as the second most common cause of the disease. The allocation of the participants was determined based on the patient's care and treatment following the ONTT protocol, with most participants receiving either methylprednisolone or prednisone orally along with outpatient therapy.

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Conflict of Interest

All authors have no conflict of interest.

Ethic Consideration

The study obtained an ethical clearance letter from Dr. Soetomo General Hospital Surabaya (No. 1090/LOE/301.4.2/X/2022) on 20-102022.

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Author Contribution

The conception and design manuscript: DDS. Analysis and interpretation of the data: DDS. Drafting of the article: DDS. Collection and assembly of data: DDS. Critical revision of the article for important intellectual content: LA and AT. Final approval of the article: LA and AT.

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