Epidemiology of Optic Neuropathy among Female Beedi Rollers in Tirunelveli District

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Asbtract: Beedi rolling is one of the most popular amongst unorganized industries, especially in some parts of the country. Women constitute a very high percentage of labour force in the industry. The nature of work is such that a worker cannot take her eye out of it even for a moment if she is to make a required number of beedi for a day. In the sheds or homes, due to dim light there is a huge possibility of eyes being affected. Optic neuropathy is one of the common diseases to which the labourers are exposed to. The toxic and nutritional optic neuropathies are actually acquired mitochondrial optic neuropathies. Vision loss in toxic and nutritional optic neuropathy is bilateral, symmetric, painless, gradual and progressive. Dyschromatopsia, a change in colour vision is often the first symptom. Loss of visual acuity may start with a blur or haze at the point of fixation. It refers to disorder of the optic nerve due to nutritional deficiency and toxicity. In its advanced stages, optic neuropathy leads to pallor of the optic nerve due to optic atrophy and the degeneration and death. Toxic and Nutritional Optic Neuropathy is progressive, with bilateral symmetrical painless.

Bio physical tests like best-corrected visual acuity (BCVA), intraocular pressure **(**IOP), cup-to-disc ratio (CDR), Colour Vision, retinal nerve fiber layer (RNFL) Thickness were done. For this study, from the nineteen blocks of Tirunelveli District, three blocks were purposively selected based on the heavy concentration of beedi rollers. From the three blocks, 752 women beedi rollers were randomly selected. Alangulam, Pappakudi and Palayamkottai were the three blocks selected for intensive study. Respondents having significant RNFL loss at least in one eye were considered as positive for optic neuropathy. 43 per cent have vision problem. 88 per cent of the respondents had normal Intra Ocular Pressure and 12 per cent of the respondents suffered from high Intra Ocular Pressure. It is inferred that 56 per cent of the respondents had normal CDR ratios while 44 per cent have abnormal CD ratio. It is evident that eight per cent had poor colour vision. 37 per cent suffered from optic neuropathy and for 63 per cent of the respondents, the results are negative. The most common example of toxic nutritional optic neuropathy is that seen in tobacco-alcohol amplyopia and poor diet.

IndexTerms: **Beedi rolling, optic neuropathy, biophysical tests.**

I. INTRODUCTION

Workers engaged in beedi rolling are chronically exposed to tobacco flakes and dust via cutaneous and nasopharyngeal routes (Mahimkar and Bhisey, 1995). Considering the high content of nicotine and other chemicals in beedi tobacco, these workers are at extremely high risk of developing systemic illness (Malson et al., 2001). Nicotine is a major component of tobacco and has potential adverse health consequences. Due to the active chemical compounds more than 50 are carcinogenic (Robert1988). Many of these workers suffer from various health hazards not because they smoke beedi but due to the fact that they make beedi.

Moreover, the nature of work is such that a worker cannot take her eye out of it even for a moment if she is to make a required number of beedi for a day. In the sheds or homes, due to dim light there is a huge possibility of eyes being affected. Optic neuropathy is one of the common diseases to which the labourers are exposed to.

The basic objective of this research study is to analyze the epidemiology of optic neuropathy of the beedi rollers. Optic Neuropathy is a group of medical disorder defined by visual impairment due to optic nerve damage secondary to toxic substance and/or nutritional deficiency. Optic neuropathy is the commonest cause for permanent visual loss. Nicotine and other vaso active components induce vasoconstriction of posterior celery arteries and produce atherosclerotic plagues of the carotid artery system. The cause of these disorders is various, but they are linked by shared signs and symptoms.

In industrialized nations, toxic and nutritional optic neuropathy is relatively uncommon and is primarily associated with specific medications, occupational exposures or tobacco and alcohol abuse. (Pan American Health Organization,1993). There are several causes of toxic optic neuropathy. Tobacco is also a major cause of toxic optic neuropathy.

The toxic and nutritional optic neuropathies are actually acquired mitochondrial optic neuropathies. Vision loss in toxic and nutritional optic neuropathy is bilateral, symmetric, painless, gradual and progressive. Dyschromatopsia, a change in colour vision is often the first symptom. Loss of visual acuity may start with a blur or haze at the point of fixation. Peripheral vision is usually spared since the pattern of loss typically involves a central orcecocentralscotoma, a visual field defect at or surrounding the point of fixation (Semba, 2007).

It refers to disorder of the optic nerve due to nutritional deficiency and toxicity. In its advanced stages, optic neuropathy leads to pallor of the optic nerve due to optic atrophy and the degeneration and death.

Biousse and Newman (2009) in their study reported that the toxic optic neuropathy is a complex, multifactorial disease potentially affecting individuals of all ages, races, places and economic strata. Etiology includes nutritional, environmental, toxicologic, and genetic factors. Most cases of nutritional amblyopia are encountered in disadvantaged countries. However, toxic amblyopia related to drug treatment or alcohol abuse is also encountered in the Western world. Typically, Toxic and Nutritional Optic Neuropathy is progressive, with bilateral symmetrical painless visual loss causing central or cecocentral scotoma. There is no specific treatment for this disorder. Nevertheless, early detection and prompt management may ameliorate and even prevent severe visual deficit. He also explained that optic neuropathy refers to disorder of the optic nerve due to any cause. In its

advanced stages, Optic Neuropathy leads to pallor of the optic nerve due to optic atrophy and the degeneration and death of optic nerve cells ultimately resulting in blindness.

According to Albert et al., (2008) and Chan (2009) various agents have been proven to damage the optic nerve including methanol, ethylene glycol, certain pharmaceutical drugs and heavy metals. The clinical presentation of Toxic Optic Neuropathy is similar to that of Nutritional Optic Neuropathy. Toxic Optic Neuropathy however, can result in total blindness and rate of visual loss is more variable (often slower) than that seen in Nutritional Optic Neuropathy.

Pan American Health Organization (1993) says that it is generally accepted that nutrient deficits can be the triggering factor for optic nerve damage in the presence of toxic exposure (Rizzo 1995). The most common example of combined Toxic-Nutritional Optic Neuropathy is that seen in tobacco-alcohol amblyopia where a combination of heavy combined alcohol and tobacco use and poor diet are suggested to cause Optic Neuropathy (Woon *et al* 1995). The Cuban epidemic of Optic Neuropathy occurring at a time of economic instability was believed to be due to a combination of nutritional deficiency and toxic insults from tobacco (and potentially alcohol) consumption.

II. METHODOLOGY

2.1 Selection of Sample

For this study, from the nineteen blocks of Trunelveli District, three blocks were purposively selected based on the heavy concentration of beedi rollers. From the three blocks, 752 women beedi rollers were randomly selected. Alangulam, Pappakudi and Palayamkottai were the three blocks selected for intensive study. The investigator has decided to contact five per cent of the female beedi rollers who have been making their living exclusively through beedi rolling for more than 10 years continuously. The lists of the respondents who have fulfilled the criteria were prepared first for the selected blocks.

Table 2.1 clearly indicates the fact that Alangulam block has the largest number of respondents for this study. Out of 752 respondents selected for this study, 312 were from this block as per the criteria followed by the investigator i.e., five per cent of the beedi rollers who fulfilled the criteria of having more than 10 years continuous experience in beedi rolling as the major source of livelihood. Alangulam block was followed by Palayamkottai block and Pappakudi block with 278 and 162 respondents respectively.

Table 2. 1 Selection of Samples

Blocks	Beedi rollers who had more than 10 years experience (Regular)	Sample Selected
Pappakudi	32,400	162
Palayamkottai	55,600	278
Alang Ulam	62,400	312
Total	**1,50,400**	**752**

III RESULTS AND DISCUSSION:

3.1 Bio- Physical Tests

Bio physical studies such as BCVA (Best Corrected Visual Acuity), IOP (Intra Ocular Pressure), OCT (Optical Coherence Tomography), and CDR have been conducted. RNFL losses at superior, nasal inferior and temporal optic disc quadrants were the primary clinical outcome indicator for optic neuropathy. Respondents having significant RNFL loss at least in one eye were considered as positive for optic neuropathy.

Table 3.1 brings out the fact that nearly half of the respondents i.e., 43 per cent have vision problem. 88 per cent of the respondents had normal Intra Ocular Pressure and 12 per cent of the respondents suffered from high Intra Ocular Pressure. It is inferred that 56 per cent of the respondents had normal CDR ratios while 44 per cent have abnormal CD ratio. The normal value of CDR is noted as 30 per cent or 0·3. It is evident that eight per cent had poor colour vision.

Table 3.1 Bio- Physical Tests

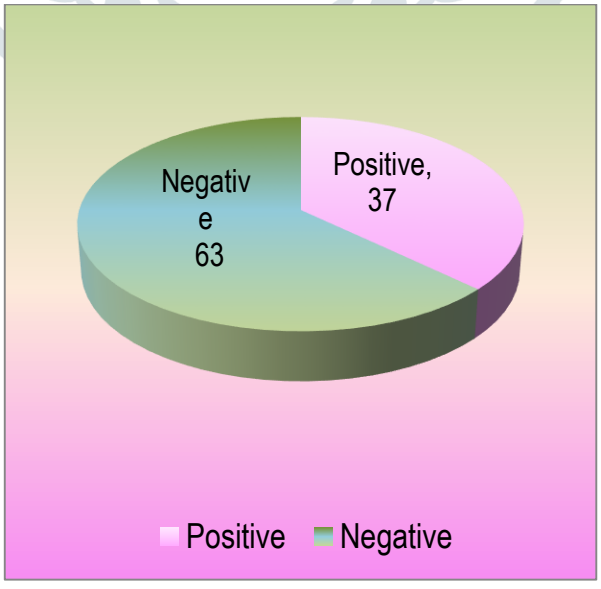
Particulars	Percentage (n=76)
	Abnormal
BCVA (Best Corrected Visual Acuity)	43
IOP (Intra Ocular Pressure)	12
CDR Ratio (Disc Changes)	44
Colour vision	8
RNFL (OCT) Thickness	37

3.2 Optical Coherence Tomography (OCT)

Table 3.2 and Fig 3.1 shows that, of the total respondents tested, 37 per cent suffered from optic neuropathy and for 63 per cent of the respondents, the results are negative. These findings were supported by the study conducted by Rizzo (1995). In his study he explained that it is generally accepted that nutrient deficits can be the triggering factor for optic nerve damage in the presence of toxic exposure. The most common example of toxic nutritional optic neuropathy is that seen in tobacco-alcohol amplyopia and poor diet

Table 3.2 Result of Optic Neuropathy

Optic Neuropathy	Percentage (n=76)
Positive	37
Negative	63
Total	100



Conclusion:

Toxic and Nutritional Optic Neuropathy is a group of medical disorder defined by visual impairment due to optic nerve damage secondary to toxic substances and/or nutritional deficiency. The cause of these disorders is various, but they are linked by shared signs and symptoms. There are several causes of toxic optic neuropathy. Tobacco is also a major cause of toxic optic neuropathy. RNFL (Retinal Nerve Fiber Layer thickness) loss at superior, nasal inferior, and temporal optic disc

quadrants was the primary clinical outcome indicator for optic neuropathy. Loss at least in one eye was considered as positive for optic neuropathy. Of the total respondents tested 37 per cent suffered from optic neuropathy. Bio physical study such as OCT- Optical Coherence Tomography, Fundus Photo and Snellen Visual Acuity has been conducted. It was revealed that 88 per cent of the respondents had normal Intra Ocular Pressure and 12 per cent of the respondents suffered from high Intra Ocular Pressure. It was observed that 56 per cent of the respondents had normal CD ratios while 44 per cent have abnormal CD ratio. The normal value of CDR is noted as 30 per cent or ·3. It is evident that 92 per cent of the respondents had normal colour vision whereas 8 per cent had poor colour vision.

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