Ocular Morbidity Among Methadone users in Kathmandu Valley

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ABSTRACT:
INTRODUCTION: Methadone is used as an oral substitution therapy to intravenous drug users to minimize the side effects of the intravenous drug use. This study is conducted to find out ocular morbidity among methadone users in Kathmandu valley.

METHOD: Clients on methadone maintenance therapy at a rehabilitation centre Kathmandu were included in the study. A cross-sectional study was conducted with a sample size of 68 in the year 2013. Ocular examination included visual acuity testing, extraocular movements, cover test, colour vision, stereoacuity, horizontal prism fusion range, accommodation and Schirmer’s test. Anterior segment and posterior segment were evaluated.

RESULT: Among 68 participants, 17.6% were hepatitis C positive, 10.3% were HIV positive and 5.9% had history of pulmonary tuberculosis. Age ranged from 20 to 59 years with 66.17% in the age group 21-30 years. 91.17% participants were males. Regarding the duration of methadone use, 48.52% were on methadone for less than 1 year, 8.82% for 1 year, 16.17% for 2 years, 10.29% for 3 years 4.41% for 4 years and 4.41% for more than 5 years. 20.58% were on <10mg of methadone, 30.88% were on 11-20mg, 20.58% were on 21-30mg, 10.29% were on 31-40mg and 17.64% were on >40mg of methadone.

Regarding color vision, red green color defect was seen in 35.29%. Dry eye was seen in 51.47%. Regarding accommodation, 52.2% had 11-20 cm and 10.3% had >21 cm of accommodation while 37.3% had normal accommodation (≤10 cm). Horizontal fusion range was 10-20 prism diptres in 39.70%, 21-30 prism diptres in 14.70% and 31-40 prism diptres in 44.11% while it was absent in 2.94% with manifest strabismus. Regarding the threshold of stereoacuity, 88.23% had ≤60 seconds of arc and 11.76% had >60 seconds of arc of stereoacuity. However, convergence has been found to be within normal limits among 78% methadone users. Refractive error was present in 47.05%, 1.4% had episcleritis, 1.4% had conjunctivitis and 1.4% had dragged disc. Statistically significant association has been observed between the dose of methadone and accommodation.

CONCLUSION: Ocular morbidities like colour vision defect, dry eye, poor accommodation, reduced stereoacuity and poor horizontal fusion range was found among methadone users in Kathmandu valley.

KEY WORDS: accommodation, color vision defect, dry eye, horizontal fusion range, methadone, stereoacuity

INTRODUCTION
Traditionally, for centuries drugs like cannabis and alcohol were used in Nepal. Use of these drugs as a part of cultural norm did not create any major social problems during that period of time. However, the types of drugs used have been shifted from cannabis to synthetic opiates and other chemical substance since the last few decades. The mode of drug use has also changed from smoking/ingesting to injecting. The injecting of drugs has become one of the major causes of HIV and hepatitis infection. Therefore substance abuse has become a fast growing problem in Nepal and its control is a major challenge.

Methadone is used as an oral substitution therapy to intravenous drug users to minimize the side effects of the intravenous drug use under harm reduction program in different rehabilitation centres in Nepal.

The dose of methadone used in treating opioid addiction is dependent upon the needs of individual patient. Therapeutic dose ranges usually between 80-120mg. It takes approximately 30 minutes for the drugs to reach plasma as it is absorbed from the gastrointestinal tract after being ingested orally. It is stored in the tissues of the body for release into the plasma. The patients’ feeling of being comfortable and stable and free from cravings results from the
combination of storage and release of methadone. The dose of methadone is titrated and finally the client becomes clean.

From late 1940s, methadone was used as a detoxifier of heroin and other opiates and from mid-1960s, as a maintenance medicine. During the last three decades, a great deal of research has shown that it is an effective medicine in treatment of addiction.

If a person is addicted to heroin or another opiate (opium, codeine, morphine), his/her doctor may recommend methadone treatment. Methadone is a prescription drug that can help to manage the addiction. It takes away the craving for heroin but does not make the person feel stoned or tired. Apart from that, it does not interfere with day-to-day activities such as driving a car or going to work.

Each dose of methadone lasts for about 24 hours so it is taken once a day. Used at the appropriate dose, methadone is a safe drug that may not have difficult side effects even if taken for 10 years or more. However, side effects like constipation, dry mouth, dry eyes have been observed.

This study aims to determine ocular morbidity among methadone users in Kathmandu valley.

METHOD

Clients on methadone maintenance therapy at a rehabilitation centre in Kathmandu were included in the study. A cross sectional study was conducted at Sarathi Nepal in Kathmandu with the sample size of 68. Ocular examination included visual acuity testing, extraocular movements, cover test, colour vision testing, stereoacuity, horizontal fusion range, accommodation and Schirmer’s test.

Visual acuity was tested using Snellen’s visual acuity chart at 6 meter distance. Extraocular movements were tested unicoiarily and binocularly. Cover test was done both for the distance at 6 meters and near at 33 centimeters. Colour vision was tested using Ishihara isochromatic chart in each eye separately and stereoacuity was tested with Frisby stereoacuity plates. Horizontal fusion range was examined with prism bar and accommodation was examined with Royal Air Force (RAF) rule. Similarly, Schirmer’s test I was done with Schirmer’s strips (Whatman filter paper number 42).

Anterior segment was evaluated for proptosis, orbital cellulitis, conjunctivitis, keratitis and uveitis using torch light and handheld slit lamp. Similarly, posterior segment was evaluated using direct ophthalmoscope and indirect ophthalmoscope for multifocal choroiditis, cytomegalovirus retinitis, acute retinal necrosis, disc oedema and toxoplasmosis. Participants were examined prior to the dose of methadone on the day of examination. Informed consent was taken from the participants for enrollment in the study. Statistical analysis was done using SPSS program (Version 17).

Ophthalmic assistants, orthoptist, and ophthalmologist were involved in patient examination and data entry in the pre designed proforma.

The participants enrolled were only on methadone maintenance therapy and were not on any other drugs since the start of rehabilitation.

RESULT

Prior to methadone maintenance therapy, participants were on heroin, norphine, diazepam, buprenorphine or brown sugar. 60.3% of the participants had no history of alcohol use, 16.5% had past history of alcohol use, 17.7% occasionally drink alcohol and 5.9% were still drinking alcohol. Among the participants, 97% (n=66) were smokers and 3% (n=2) were nonsmokers. Only 47% (n=32) of the participants were earning themselves while the rest depended on their family members. Regarding the education level, 4.5% (n=3) had completed master’s degree, 17.6% (n=12) were either studying or completed Bachelor’s level, 23.5% (n=16) had completed higher secondary level, 13.2% (n=9) had completed grade ten while 41% had not even completed grade ten.

Among 68 participants, 17.6% (n=12) were hepatitis C positive, 10.3% (n=7) were HIV positive and 5.9% (n=4) had history of pulmonary tuberculosis. Age ranged from 20 to 59 years with 66.17% in the age group 21-30 years. 91.17% participants were males and 8.83% females. Regarding color vision, red green color defect was seen in 35.29%.

The mean age of the participants was 31.38 years. As the duration of use of methadone increased, the dose requirement decreases. The mean duration of use of methadone among the participants was 1.85 years.
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Table I: Distribution of Duration of Methadone Use

<table>
<thead>
<tr>
<th>Duration of Use of Methadone</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>&lt; 1 year</td>
<td>45.6%</td>
</tr>
<tr>
<td>1 year</td>
<td>13.2%</td>
</tr>
<tr>
<td>2 years</td>
<td>13.2%</td>
</tr>
<tr>
<td>3 years</td>
<td>10.3%</td>
</tr>
<tr>
<td>4 years</td>
<td>4.4%</td>
</tr>
<tr>
<td>5 years</td>
<td>8.8%</td>
</tr>
<tr>
<td>&gt; 5 years</td>
<td>4.4%</td>
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</tbody>
</table>

Table II: Distribution of Dose of Methadone Use

<table>
<thead>
<tr>
<th>Dose of Methadone</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;10 mg</td>
<td>20.58%</td>
</tr>
<tr>
<td>11-20 mg</td>
<td>30.88%</td>
</tr>
<tr>
<td>21-30 mg</td>
<td>20.58%</td>
</tr>
<tr>
<td>31-40 mg</td>
<td>10.29%</td>
</tr>
<tr>
<td>&gt; 40 mg</td>
<td>17.64%</td>
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Table III: Distribution of accommodation

<table>
<thead>
<tr>
<th>Accommodation</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>6-10 cm</td>
<td>38.24%</td>
</tr>
<tr>
<td>11-20 cm</td>
<td>51.47%</td>
</tr>
<tr>
<td>&gt;21 cm</td>
<td>10.29%</td>
</tr>
</tbody>
</table>

Regarding accommodation, 38.24% had normal accommodation while 61.37% had reduced accommodation. However, convergence has been found to be within normal limits among 78% methadone users in the present study (Table III).

Horizontal fusion range was poor (10-20Δ) in 39.70%, moderate (21-30Δ) in 14.70% and good (31-40Δ) in 44.11% while 2.94% did not have horizontal fusion range. Regarding the threshold of stereoacuity, 11.76% had reduced stereoacuity (>60 seconds of arc) while 88.23% had normal (≤ 60 seconds of arc) stereo acuity.

Table IV: Distribution of size of pupil

<table>
<thead>
<tr>
<th>Size of the pupil (in mm)</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>1.5</td>
<td>9</td>
<td>13.2</td>
</tr>
<tr>
<td>2.0</td>
<td>37</td>
<td>54.4</td>
</tr>
<tr>
<td>2.5</td>
<td>7</td>
<td>10.3</td>
</tr>
<tr>
<td>3.0</td>
<td>13</td>
<td>19.1</td>
</tr>
<tr>
<td>4.0</td>
<td>1</td>
<td>1.5</td>
</tr>
</tbody>
</table>

Constriction of pupil ≤ 2mm was present in 69.10% of the participants.

Regarding ocular morbidity, colour vision defect was seen in 35.29%, dry eye in 51.47%, reduced accommodation in 10.29%, poor horizontal fusion range in 39.7% and decreased stereoacuity in 11.76%. Similarly, refractive error was present in 47.05%, episcleritis, conjunctivitis and dragged disc in 1.4% each (Figure I).

Association was observed between the dose of methadone in milligrams and duration of methadone in years with color vision defect, dry eye, horizontal fusion range, accommodation and stereoacuity. Statistically significant association has been found only between the dose of methadone and accommodation (p value = 0.006). With the increase in the dose of methadone accommodation insufficiency has been found.

DISCUSSION

Heroin, morphine and methadone are the narcotics and main abuse occur with heroin and methadone. Methadone’s common side effects are constipation and excessive sweating⁶.

In a study by Janie Sheridan et al, among methadone maintenance clients, 51.6% had hepatitis C, 5.4% had hepatitis B while none had HIV⁷. In the present study, hepatitis C was positive in 17.6% and HIV was positive in 10.3% while none had hepatitis B.

Methadone has been found to cause dry mouth, dry eyes or nose. In the present study also, dry eye was present in 51.47%. However, among 68 participants, 17.64% were hepatitis C positive and dry eye syndrome similar to Sjögren syndrome has been found in hepatitis C virus infection also⁸.
CONCLUSION

Color vision defect, dry eyes, poor accommodation, poor horizontal fusion range and reduced stereoacuity are the ocular morbidities found among methadone users in a rehabilitation center in Kathmandu valley. Significant association was found between the dose of methadone and accommodation.

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Colour vision defect was found to be reduced in the blue purple range in heroin addicts compared with controls in a study by Alison Y. Firth. As there was no macular lesions in the heroin user, colour vision defect could be retinal or within the visual pathway. In the present study also colour vision defect was seen in 35.29% methadone users.

Perez et al reported decreased or abnormal accommodation in 10 of 15 heroin users. In the present study, accommodation was reduced in 61.76%. However, there was no difference in subjective accommodation between controls and patients before and after detoxification in a study by A.Y. Firth.

Stereo-acuity, visual acuity and convergence were found to be reduced in the immediate post detoxification period in a study by Firth et al. Visual acuity reduction was not due to refractive changes. Opioid receptors have been identified in the ganglion cell layer of the human retina. Stereoacuity was reduced (> 60 seconds of arc) in 11.76% in the present study also. However, convergence has been found to be within normal limits among methadone users in the present study.

Median values for the total fusion range for near were decreased compared with control subjects than heroin addicts in a study by A Y Firth et al. In the present study, horizontal fusion range was poor in 39.70% and moderate in 14.70%.

Both heroin and methadone can cause pin point pupil. The mechanism for the miosis is unclear. Opiate receptors are located in various areas within the brain which include the pretectal area, superior colliculus and ventral nucleus of the lateral geniculate body. However, whether it is stimulation in these areas; the lack of inhibition from the cortex to these areas or the Edinger-Westphal nucleus; direct action on the neurons subserving the parasympathetic light reflex in the Edinger-Westphal nucleus; or stimulation of opioid receptors in the iris sphincter is not known. Weinhold and Bigelow found the peak miosis was 90 minutes after methadone administration and best detected under moderately dim lighting conditions. In the present study, 54.41% had pupil of 2 mm. This could be because the participants were examined prior to the dose of methadone on the day of examination.

Limitations of the study are small number of participants and participants from only one rehabilitation center.
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