

# โรคทางตาที่พบบ่อยในผู้ต้องขังพิกการ จังหวัดอุบลราชธานี

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## Epidemiology of Eye Diseases in Handicapped Inmates, Ubon Ratchathani Province

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**หลักการและวัตถุประสงค์:** ตาบอดและความบกพร่องทางการมองเห็นเป็นปัญหาระดับนานาชาติ สาเหตุส่วนใหญ่ป้องกันได้ ผู้ต้องขังพิกการเป็นผู้ที่ถูกจำกัดอิสรภาพแต่ควรได้รับการดูแลสุขภาพต่อเนื่อง การศึกษาความชุกโรคตาอาจทำให้สามารถวางแผนการคัดกรองและการดูแลผู้ป่วยโรคตาแบบองค์รวมให้แก่ผู้ต้องขังพิกการได้อย่างมีประสิทธิภาพต่อไป

**วิธีการศึกษา:** เป็นการศึกษาเชิงพรรณนาโดยเก็บข้อมูลจากแบบสอบถาม ตรวจค่าสายตา และตรวจตาผู้ต้องขังพิกการ ณ เรือนจำกลาง จังหวัดอุบลราชธานี ระหว่างเดือนกุมภาพันธ์ ถึง มีนาคม 2563

**ผลการศึกษา:** ผู้ต้องขังพิกการทั้งหมด 60 ราย ส่วนใหญ่เป็นผู้พิการทางการเคลื่อนไหว 58 ราย (ร้อยละ 96.67) พบความบกพร่องการมองเห็นระยะไกล 16 ราย (ร้อยละ 26.67) สาเหตุที่พบบ่อยคือต้อกระจกและค่าสายตาผิดปกติ ในผู้ที่อายุตั้งแต่ 35 ปีขึ้นไปพบความบกพร่องการมองเห็นระยะใกล้ 18 ราย (ร้อยละ 39.1) อาการตาแห้งพบได้บ่อยและสอดคล้องกับความผิดปกติของผิวตา เช่น ต้อลม ต้อเนื้อ การติดสีผิดปกติของเยื่อตาและกระจกตา คิดเป็นร้อยละ 98.33, 35 และ 75 ตามลำดับ

**สรุป:** ความบกพร่องทางการมองเห็นและโรคตาพบได้บ่อย จำเป็นต้องได้รับการดูแลโดยทีมสหวิชาชีพ เจ้าหน้าที่เรือนจำ และจักษุแพทย์ การตรวจวัดระดับสายตา การคัดกรองโรคตาในเรือนจำที่มีประสิทธิภาพและการส่งต่อพบจักษุแพทย์เป็นสิ่งจำเป็น โรคผิวหนังเป็นสิ่งที่จะต้องตระหนักในผู้ต้องขังพิกการที่มีความผิดปกติทางการมองเห็น

**คำสำคัญ:** ผู้ต้องขังพิกการ; ความบกพร่องทางการมองเห็น; โรคตา; โรคผิวหนัง; เรือนจำ

**Background and objectives:** Blindness and vision impairment (VI) are a global problem that the causes of the VI are usually preventable. Handicapped inmate (HI) has their freedom restricted, however, a proper healthcare should not be restricted. Epidemiological study about eye diseases may be useful for planning the effective screening program and comprehensive eye care in HIs.

**Methods:** A descriptive analysis using a data from questionnaires, refractive values and comprehensive eye exam in HIs at the central prison, Ubon Ratchathani province was done between February - March 2020.

**Results:** Sixty HIs in this study, which 58 HIs had physical disability (96.67%). Sixteen HIs had distant VI (26.67%), which common causes were cataract and refractive error. HIs whom aged 35 years old and older had near VI about 18 cases (39.1%). Dry eye symptoms were commonly found which compatible with ocular surface abnormalities e.g. pinguecula, pterygium and abnormal conjunctival and corneal fluorescein staining were 98.33%, 35% and 75%, respectively.

**Conclusion:** VI and eye diseases were commonly found in HIs which should be received a comprehensive eye care from public health team, prison staff and ophthalmologist. Effective visual acuity testing, eye disease screening in prison and referring to ophthalmologist are necessary. Ocular surface diseases should be concerned in HIs with vision disturbance.

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**Keywords:** handicapped inmate; vision impairment; eye disease; ocular surface disease; prison

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## Introduction

Nowadays, Thailand government gazette states and describes the disability into 7 groups which are vision disability, hearing disability, physical disability, mental or behavioral disabilities, intellectual disability, learning disability and autism. Blindness and vision impairment (VI) have been reported by world health organization (WHO) which were global problems. People who are in prison have the right to receive a proper health care as everyone else.<sup>1,2</sup> Prison administrations have a responsibility to ensure that inmates receive a proper health care and that prison conditions promote the well-being.<sup>1</sup> When Thai inmates get sick, prison medical facility will provide basic medical care. For a case with severe symptom, medical personnel will report to the prison director for considering whether to refer for an appropriate external medical facility. The protocol for referring a sick inmate to receive an external treatment are quite specific due to be an inmate. There are safety factors to be concerned, to prevent the escape of sick inmates.<sup>2</sup> Handicapped inmates (HIs) are the vulnerable group and may be increased suffering from VI and eye diseases. The purpose of this study was to evaluate the epidemiology of eye diseases in HIs at central prison, Ubon Ratchathani province which may be useful for planning the effective screening program and comprehensive eye care in HIs.

## Materials and Methods

This was a descriptive study and conducted at the central prison, Ubon Ratchathani province during 2020 with institutional review board regulations, Ubon Ratchathani university (UBU) [UBU-REC-52/2562], informed consent regulations. All HIs were informed consent.

We established a sight and ocular caring project for HIs at the central prison. All seventy-seven HIs who had disabled Thai ID card were included in this study. We excluded the HIs who failure to give consent, pregnant woman, cognitive or learning disabilities, mental or behavioral disabilities, autism, and vision disability. Data collection in this study was as the information below.

### 1. Variables related to eye health

All HIs were asked about age, sex, imprisonment period, type of disability, ocular and systemic history, history of previous eye exam by ophthalmologist, previous refraction and sight problems.

### 2. Ocular surface symptoms scores

The ocular surface symptoms and dry eye were evaluated by asking for severity during a week including; ocular discomfort, dryness, itching, burning, fluctuation of vision, sensitive to light and foreign body sensation using a visual analog scale (range: 0-10 mark(s); 0: no symptom and 10: the worst symptoms)<sup>3,4</sup> in each item and total score equal to 70 marks.

### 3. Autorefractive value measurement

Measurement of the autorefractive value was performed using the auto refkeratometer (TOMEY® RC-5000, Aichi, Japan) for 1 time in each eye. The prevalence of refractive error was collected from the better seeing eye which affected to quality of life. Refractive error was categorized using the following definitions: myopia, spherical equivalent [SE] objective refractive power error is  $\leq -0.5$  diopter [D]<sup>5</sup>; hyperopia, SE objective refractive power error  $\geq +1$  D; astigmatism, cylindrical objective refractive error  $\leq -1.0$  D<sup>6</sup>.

### 4. Distant VA assessment

Presenting distant VA was measured in each eye using a Snellen chart at 6 meters. WHO has classified levels of distant VI based on presenting VA as same as the International Classification of Disease 11 (2018) and categorized relate to the presenting distant VA : mild VI ( $< 6/12$  but can see 6/18), moderate VI ( $< 6/18$  but can see 6/60), severe VI ( $< 6/60$  but can see 3/60), and blindness ( $< 3/60$ ).<sup>7</sup> The cause of VI in each eye was determined for HI who presented with VA  $< 6/12$  by one ophthalmologist.

### 5. Near VA assessment

HIs whom aged 35 years old and above were measured presenting near VA using a near reading chart at 14 inches with the best distant correction or with the existing near correction. Near VI was defined

when presenting near VA < 20/40 or worse than N6 with existing correction.<sup>8</sup>

## 6. Anterior segment exam

All subjects underwent a complete ophthalmic exam both eyes by one ophthalmologist. Slit lamp (CSO® SL9900, Firenze, Italy) was used to exam the cylindrical dandruff (CD), pinguecula, pterygium, corneal scar, fluorescein-tear breakup time (fTBUT), conjunctival and corneal fluorescein staining scale, IOP measurement and cataract evaluation. Diagnosis is made from the present of these in one or both eyes.

### 6.1 Ophthalmic definition

CD was defined as scales that form clear cuffs that collar the lash root.<sup>9,10</sup> Pinguecula was defined as a yellow-white deposit on the conjunctiva of the eye. Pterygium was defined as growth of pink, fleshy tissue on the conjunctiva of the eye. Grading of pterygium was categorized as 3 grades. Grade 1 covered pterygium that was between the limbus and a point midway between the limbus and the pupillary margin. Grade 2 was defined as head of the pterygium present between a point midway between limbus and pupillary margin. Grade 3 as pterygium that crossing pupillary margin.<sup>11</sup> Corneal scar was defined as an opacity on or within the corneal surface of the eye. Corneal scar that involved visual axis was defined as lesion that crossing pupillary margin or within the pupillary area.

### 6.2 fTBUT

Fluorescein sodium strip moistened with a drop of normal saline solution was applied to inferior fornix in both eyes. After removing the strip, the subject was asked to blink three times. The precorneal tear film was assessed with slit lamp and cobalt blue filter. The measurement of right eye was done for 3 times and average fTBUT were recorded.

### 6.3 Conjunctival and corneal fluorescein staining scale

The conjunctival and corneal fluorescein staining were assessed with slit lamp, cobalt blue filter and graded for severity according to Oxford grading scheme (grade 0-5).<sup>12</sup>

### 6.4 Goldmann applanation tonometer [GAT] reading

One IOP reading was obtained on both eyes before pupillary dilation by GAT (A900; CSO®, Firenze, Italy) using the slit lamp mounted GAT. 0.5%Tetracaine eyedrop was used as the topical anaesthetic and the eyes were stained with sterile wetted fluorescein strip. A magnification of 10X on the slit lamp was used with cobalt blue filter to detect end points.

### 6.5. Cataract evaluation

After dilation of the pupils at least 6 mm with 1%Mydracyl eyedrop, lens of the both eyes were examined for the presence and graded cataract by using the Lens Opacities Classification System III [LOCS III] figures.<sup>13</sup> Cataract was defined as any LOCS III grading of  $\geq 2$  in either eye.

### 7. Glaucomatous optic neuropathy [GON] assessment

Vertical cup disc ratio (CDR) and posterior segment were evaluated by indirect ophthalmoscope. GON was defined as a vertical CDR  $\geq 0.6$ , asymmetry of CDR  $\geq 0.2$  between eyes, presence of localized pre-retinal nerve fiber layer defects, and/or neuroretinal rim defects in the absence of any other abnormalities that could explain such findings.<sup>14</sup>

### Statistical analysis

A descriptive analysis of all the variables study were performed using absolute frequencies and proportions for the qualitative variables. Mean  $\pm$  SD and median (min, max) were used to summarize quantitative variables with normal and non-normal distribution, respectively.

## Results

There were 6,515 inmates prisoned during 2020. Seventy-seven inmates (1.18%) had disabled Thai ID card. Sixty-two HIs (80.52%) were informed consent and included in this study. Two HIs were excluded due to vision and mental disabilities. Baseline characteristics of 60 HIs were shown in Table 1. There were 46 HIs whom aged  $\geq 35$  years old. Forty-one percent of HIs reported distant vision problems and 69% had near vision problems but most of them did not have spectacles usage (Table 2). Refractive error was found nearly 50% of the HIs and myopia with astigmatism was the most common type of refractive error (Table 3).

**Table 1** Demographic data

Variables	Frequency (%)
<b>Sex</b>	
Male	60 (100.00)
<b>Age (years)</b>	
21-30	8 (13.33)
31-40	11 (18.33)
41-50	21 (35.00)
51-60	10 (16.67)
>60	10 (16.67)
<b>Imprisonment period (years)</b>	
< 5	52 (86.67)
5-10	8 (13.33)
<b>Type of disability</b>	
Physical disability	58 (96.67)
Hearing disability	2 (3.33)
<b>Underlying disease (U/D)</b>	
No U/D	39 (65.00)
Hypertension	4 (6.67)
Cerebrovascular disease	4 (6.67)
Type 2 diabetes mellitus	3 (5.00)
Gout, unspecified	3 (5.00)
Psychiatric disorder	2 (3.33)
Others (orbital cancer, rheumatoid arthritis, hemophilia, benign prostatic hyperplasia, urinary calculi, dyspepsia, hemorrhoid, asthma)	8 (13.33)

Overall age groups found that fluctuation of vision and sensitive to light were the most common ocular complains in HIs and the symptoms severity likely increased with age (Table 4).

Distant and near VI in HIs were found 26% and 39%, respectively. Moderate monocular VI was the most common type of distant VI. Cataract was the most common cause of distant VI in this study (Table 5).

Ocular examination shown none of HIs had IOP more than 21 mmHg. Pinguecula was the most common ocular disease. Corneal scar can be found 20%, which most of these were not involved visual axis. Conjunctival and corneal fluorescein staining also be found 75% and grade 1 severity was the most common grading (Table 6). Overall FTBUT was 4.94±3.11 sec

**Table 2** Variables related to eye health

Variables	Frequency (%)
<b>Previous ocular exam by ophthalmologist</b>	
Yes	11 (18.33)
No	49 (81.67)
<b>Previous assessing for refractive error</b>	
In prison	7 (11.67)
In optical shop [outside]	4 (6.67)
No	49 (81.66)
<b>Previous ocular surgery</b>	
Orbital surgery	1 (1.67)
No	59 (98.33)
<b>Self report about sight problems</b>	
Distant vision	25 (41.67)
Near vision [age ≥35 years old]	32 (69.57)
<b>Previous spectacles usage</b>	
Distant spectacles	7 (11.67)
Near spectacles [age ≥35 years old]	13 (28.26)
<b>Previous ocular trauma</b>	
Metallic foreign body	2 (3.33)
Vegetative material hit the eye	1 (1.67)
Insect foreign body	1 (1.67)

**Table 3** Prevalence of refractive error

Type of refractive error	Frequency (%)
Myopia	4 (6.67)
Hyperopia	3 (5.00)
Astigmatism	10 (16.66)
Myopia with astigmatism	12 (20.00)
Cannot be evaluated	1 (1.67)

and seem decreased with age (Table 7). None of diabetic patients had diabetic retinopathy.

### Discussion

Blindness and VI are a global problem that affect estimated 2.2 billion people which the leading causes were uncorrected refractive errors and cataract like in this study.<sup>8</sup> About 40% of HIs whom aged ≥ 35 years had near VI. Most of refractive error and

Table 4 Ocular surface symptoms scores

Age group	Median (min, max) [mark(s)]							Total score
	Ocular discomfort	Dryness	Itching	Burning	Fluctuation of vision	sensitive to light	FB sensation	
21-30 years	0 (0, 5)	0 (0, 5)	0 (0, 5)	1.5 (0, 5)	0.5 (0, 7)	0 (0, 5)	0 (0, 3)	10 (0, 22)
31-40 years	0.5 (0, 8)	1 (0, 9)	2 (0, 9)	1 (0, 9)	3 (0, 9)	5 (0, 10)	0 (0, 10)	12 (2, 58)
41-50 years	5 (0, 10)	2 (0, 8)	0 (0, 10)	1 (0, 10)	5 (0, 10)	5 (0, 10)	0 (0, 8)	25 (2, 58)
51-60 years	6.5 (0, 10)	0 (0, 10)	5 (0, 10)	5 (0, 10)	9 (4, 10)	5 (0, 9)	5 (0, 10)	33.5 (17, 60)
> 60 years	5.5 (0, 10)	5 (0, 10)	6 (0, 10)	5.5 (0, 10)	9 (0, 10)	3 (0, 10)	7.5 (0, 10)	39 (0, 70)
Overall age groups	3 (0, 10)	0.5 (0, 10)	2 (0, 10)	2 (0, 10)	5 (0, 10)	5 (0, 10)	0.5 (0, 10)	23.5 (0, 70)

Table 5 Prevalence and causes of distant and near VI

Parameter	Frequency (%)
<b>Distant VI</b>	
Number of distant VI cases	16 (26.67)
<b>Type of distant VI</b>	
Moderate monocular VI	8 (13.33)
Severe monocular VI	3 (5.00)
Monocular blindness	5 (8.33)
Binocular	
Mild	0 (0.00)
Moderate	2 (3.33)
Severe	0 (0.00)
Blindness	1 (1.67)
Number of eyes with distant VI	22 (18.33)
<b>Causes of VI [22 eyes]</b>	
Cataract	13 (59.09)
Refractive error	5 (22.72)
Pterygium	2 (9.09)
Orbital cancer	1 (4.55)
Corneal opacity	1 (4.55)
<b>Near VI [age ≥35 years]</b>	
Number of near VI cases	18 (39.13)

Table 6 Prevalence of ocular characteristics and diseases

Variables	Frequency (%)
Cylindrical dandruff	0 (0.00)
Pinguecula	59 (98.33)
<b>Pterygium</b>	
At least one or both eyes	21 (35.00)
<b>Grading of pterygium [31 eyes]</b>	
Grade 1	25 (80.65)
Grade 2	4 (12.90)
Grade 3	2 (6.45)
<b>Corneal scar</b>	
At least one or both eyes	12 (20.00)
Involved visual axis	5 (8.33)
<b>Conjunctival and corneal fluorescein staining</b>	
Grade 0 both eyes	15 (25.00)
Grade 1 at least one or both eyes	43 (71.67)
Grade 2 at least one or both eyes	2 (3.33)
<b>Cataract</b>	
At least one or both eyes	54 (90.00)
<b>Glaucomatous optic neuropathy suspected</b>	
At least one or both eyes	5 (8.33)

Table 7 fTBUT values

Age group	Mean $\pm$ SD [sec]
21-30 years	8.92 $\pm$ 1.55
31-40 years	6.58 $\pm$ 3.30
41-50 years	4.94 $\pm$ 2.78
51-60 years	2.27 $\pm$ 0.75
> 60 years	2.70 $\pm$ 0.85
Overall age groups	4.94 $\pm$ 3.11

presbyopia can be corrected with glasses and serviced in prison. Previous projects in prison were diabetic retinopathy and refractive screening. Only 1/5 of HIs had previous refractive assessment, so the prevalence of distant VI in this study was still high, compare to the previous study<sup>15</sup> (26.67% and 3.44%), respectively. 1.67% of HIs cannot be evaluated for autorefractive value due to pterygium grade 3.

Dry eye disease (DED) is also a global problem which affected hundreds of millions of people throughout the world and is one of the most frequent causes of patient visits to eye care practitioners. Moderate to severe DED is associated with significant pain, limitations in performing daily activities, reduced vitality, poor general health and often depression.<sup>16</sup> Studies had shown that HIs had many dry eye symptoms e.g. fluctuation of vision, sensitive to light and ocular discomfort which compatible with ocular surface abnormalities and short fTBUT. The prevalence of pinguecula and pterygium in this study (98% and 35%) were found more than the previous study in Thai elderly (76.6% and 19.7% respectively).<sup>17</sup>

Previous review reported about low socioeconomic was a risk factor for Demodex. In this study we did not found CD which was a pathognomonic sign of Demodex blepharitis. However, demodicosis was not common. The exact prevalence of demodex in HIs need further lash sampling and exam under microscope.<sup>10</sup>

Cataract was commonly found in HIs and significant cataract was the major cause of distant VI in this study (59%). Both significant cataract and pterygium grade 3 (6.45%) were need further surgical intervention. GON suspect also found 8.33% and need more investigations for diagnosis. Ophthalmologist played an important role in these diseases.

Limitation in this study was due to short screening period and no disease followed up which

may not reflect the exact epidemiology of eye diseases in prison.

In the purpose of preventive measurement, the relationship between risk factor and eye disease in prison should be further investigated. Improving continuous eye care in prison including visual acuity testing, eye disease screening in prison and referring to ophthalmologist are necessary.

### Conclusion

VI and eye diseases were commonly found in HIs which should be received a comprehensive eye care from public health team, prison staff and ophthalmologist. Effective visual acuity testing, eye disease screening in prison and referring to ophthalmologist are necessary. Ocular surface problems should be concerned in HIs with vision disturbance.

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