Visual health assessment amongst in service police personnel

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Abstract

Aim: The study of visual health of the police personnel attending the annual health check-up.

Background: The visual requirements are high for a police officer and there are many standards set before the recruitment of individuals into the police force. But regular eye examination is required in order to ensure that the standards are maintained and thus allows these personnel to continue their work unhindered.

Method: The study included 462 individuals who underwent a visual health screening as part of their annual health check-up. These individuals were examined at M.S. Ramaiah Medical hospital, department of ophthalmology. Vision testing with Snellen's chart, color vision testing by Ishihara's chart, refraction, slit lamp examination and fundoscopy were performed for all the individuals. The data was analyzed using SPSS software.

Results: There were 422 males and 40 female candidates. Of the candidates 79% had unaided distant visual acuity (UCVA) of 6/6, while 97.8% had a best corrected visual acuity (BCVA) of 6/6. Nineteen (4.1%) individuals had uncorrected visual acuity below 6/18 and of these only five had BCVA of less than 6/18. While only 62.4% had uncorrected near visual acuity of N6, corrected near vision of N6 was achieved in 98.7% individuals. Color vision by Ishihara's test was normal in 99.4% individuals and three (0.6%) of them had deficiency. BCVA in individuals with and without diabetes was compared, 4.4% of those with diabetes had visual impairment compared to only 0.8% in individuals without diabetes, which was significant. Amongst hypertensive individuals, 93.5% had vision above 6/18 while 7.5% had visual impairment compared to 99.5% with good vision and only 0.5% with visual impairment in non-hypertensive group. This difference was statistically significant.

Conclusion: Police personnel have very stringent visual standards during recruitment hence the visual health of these individuals is good with 97.6% of the total individuals having a BCVA of 6/6. However over the age of 40years, near vision is affected in most individuals and requires correction and those with other systemic conditions of diabetes and hypertension require a more regular follow up in order to ensure that high visual standards are maintained and does not interfere in carrying out the duties that their job demands.

Keywords: Visual health, Police personnel, Vision standards, Police officer, Vision requirement

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Introduction

The significance of vision amongst those involved in law enforcement is well known. Good vision is a very important attribute for police officers and almost all countries[1,2,3] have a set of pre-requisite standards, which have to be fulfilled prior to enrolling individuals into the police department.

Many governments have set necessary standards for enrollment into the police force but these individuals also require regular visual health check to ensure that the minimum vision standards are maintained throughout their professional career.

In this study we aim to look at the visual health of these police personnel after recruitment.

Materials and Methods

The study included all police personnel attending the Ophthalmology department during November 2015 to January 2016. The individuals were undergoing annual health checkup. The data was retrieved from their case sheets and the data collected was analyzed using SPSS software.

Results

The study is a cross sectional study of all individuals who attended the annual health checkup and hence included the whole range of individuals from 26 years of age to 60 years. Out of 462 individuals we had 422 male and 40 female attendants. The age distribution of the individuals is given in Table 1.

Table 1: Age distribution of individuals

Age	Number
<40	253 (55%)
41-50	71 (15%)
51-60	138 (30%)

68 (14.7%) individuals had diabetes mellitus and 57(12.3%) candidates had hypertension.

The visual acuity was grouped into three categories Good Vision: 6/6 to 6/18, Mild visual impairment: 6/24 to 6/60 and severe visual impairment less than 6/60.

Age wise visual acuity assessment has been shown in Table 2. Below the age of 40 years 98.8% had good vision, between 41-50 years 98.6% belonged to good vision category but between 51-60 years only 88.8% were in the good vision category, with 11.2 % having visual acuity below 6/18.

Table 2: Age wise uncorrected visual acuity (UCVA)**

	UCVA			Total*
	Good vision	Mild visual impairment	Severe visual impairment	
<40years	250	3	0	253
	98.80%	1.20%	0.00%	100.00%
41-50 years	69	1	0	70
	98.60%	1.40%	0.00%	100.00%
51-60 years	119	13	2	134
	88.80%	9.70%	1.50%	100.00%
Total	438	17	2	457
	95.80%	3.70%	0.40%	100.00%

*- 5 patients UCVA Data was not retrievable hence not included in the data
** UCVA of Right eye is demonstrated here, as both right and left eye were similar

Table 3: Age wise best-corrected visual acuity (BCVA)

	BCVA			Total
	Good vision	Mild visual impairment	Severe visual impairment	
<40years	253	0	0	253
	100.00%	0.00%	0.00%	100.00%
41-50years	71	0	0	71
	100.00%	0.00%	0.00%	100.00%
51-60years	133	3	2	138
	96.40%	2.20%	1.40%	100.00%
	457	3	2	462
	98.90%	0.60%	0.40%	100.00%

The best corrected visual acuity (BCVA) was checked and the age wise visual acuity has been represented in the Table 3. Below age of 40 years 100% had vision above 6/18(all these individuals had BCVA of 6/6). Between 41-50 years, 100% had good vision (out of these 98.6% had 6/6) but between 51-60, 96.4% had BCVA above 6/18(92.8% had 6/6 vision). 3.6% of the individuals over 51 years had BCVA below 6/18.

The near vision of the individuals was checked with Snellen's near vision chart and it has been shown in table 4. As the age progresses presbyopia sets in and the following table conforms to the normal physiological change, 60.9% of the individuals in the age group 41-50 and 97.7% in the age group 51-60 have altered near vision. The corrected near vision has been shown in Table 5 showing improvement in the near vision acuity.

Table 4: Near vision acuity age wise distribution

Age	near vision							Total
	N6	N8	N10	N12	N18	N24	N36	
< 40	250	2	0	1	0	0	0	253
	98.8%	.8%	0.0%	.4%	0.0%	0.0%	0.0%	100.0%
41 - 50	27	22	12	3	4	1	0	69
	39.1%	31.9%	17.4%	4.3%	5.8%	1.4%	0.0%	100.0%
51 - 60	3	18	54	30	10	10	5	130
	2.3%	13.8%	41.5%	23.1%	7.7%	7.7%	3.8%	100.0%
Total	280	42	66	34	14	11	5	452
	61.9%	9.3%	14.6%	7.5%	3.1%	2.4%	1.1%	100.0%

Table 5: Near vision aided

Age	NV aided					Total
	N6	N8	N10	N12	N36	
< 40	253	0	0	0	0	253
	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%
41 - 50	70	1	0	0	0	71
	98.6%	1.4%	0.0%	0.0%	0.0%	100.0%
51 - 60	131	2	1	1	3	138
	94.9%	1.4%	.7%	.7%	2.2%	100.0%
Total	454	3	1	1	3	462
	98.3%	.6%	.2%	.2%	.6%	100.0%

Color vision tests by Ishihara's chart showed 99.4% individuals with normal color vision and 3 individuals had deficiency.

The individuals with diabetes and hypertension were evaluated separately.

Of the 68 patients with diabetes, 8 individuals (11.7%) had visual impairment compared to 20 individuals (5.1%) out of 369 without diabetes. This difference was statistically significant with a p value of 0.001. When BCVA was compared 3 individuals out of 68 with diabetes mellitus continued to have visual impairment (4.4%) while those without diabetes only 3(0.8%) out of 391 had mild visual impairment and none with severe vision impairment showing a p value of 0.002. The two individuals with severe impairment had diabetic retinopathy changes. This has been depicted in Table 6 and Table 7.

Table 6: Vision UCVA in individuals with and without diabetes

Diabetes	BCVA			Total
	Good vision	Mild Visual Impairment	Severe visual impairment	
Present	60	6	2	68
	88.2%	8.8%	2.9%	100.0%
Absent	369	20	0	389
	94.9%	5.1%	0.0%	100.0%
Total	429	26	2	457
	93.9%	5.7%	.4%	100.0%

Table 7: BCVA in individuals with and without diabetes

Diabetes	BCVA			Total
	Good vision	Mild Visual Impairment	Severe visual impairemnt	
Present	65	1	2	68
	95.6%	1.5%	2.9%	100.0%
Absent	391	3	0	394
	99.2%	.8%	0.0%	100.0%
	456	4	2	462
	98.7%	.9%	.4%	100.0%

The effect of hypertension on visual acuity was also assessed. When UCVA was compared patients with hypertension 87.5% had normal vision while 12.4% had visual impairment compared to 94.8% normal vision and 5.2% visual impairment in the non- hypertensive group. BCVA assessment revealed 93% had good vision and 7% had vision impairment compared to non- hypertensive in whom 99.5% had good vision and 0.5% had vision impairment. This difference was statistically significant with p value below 0.005.

Table 8: Effect of hypertension on UCVA

Hypertension	UCVA			Total
	Good vision	Visual Impairment	Severe visual impairment	
Present	49	5	2	56
	87.5%	8.9%	3.6%	100.0%
Absent	380	21	0	401
	94.8%	5.2%	0.0%	100.0%
Total	429	26	2	457
	93.9%	5.7%	.4%	100.0%

Table 9: BCVA in individuals with and without hypertension

Hypertension	BCVA			Total
	Good vision	Visual Impairment	Severe visual impairment	
Present	53	2	2	57
	93.0%	3.5%	3.5%	100.0%
Absent	403	2	0	405
	99.5%	.5%	0.0%	100.0%
Total	456	4	2	462
	98.7%	.9%	.4%	100.0%

Discussion

Our study is the first of the kind and no similar studies have been published. Good vision is critical in the profession of law enforcement. There are many facets to the visual abilities and few of them are critical in the job performance. The visual abilities include distance vision, near vision and color vision. These abilities can reduce with age and also following injury. The police personnel are at high risk for any injury and hence it becomes mandatory, that the police personnel be regularly checked regarding their visual health.

Distant visual acuity refers to seeing objects and surroundings that are six feet and further away. This is a critical aspect of visual acuity that the police officer requires in order to identify individuals at six feet, in pursuit driving and also in reading signs while driving[(2)]. Distant visual acuity must be considered in two contexts of corrected and uncorrected visual acuity. Due to their job description police officers might have to perform their duties without their correction and hence a good unaided visual acuity is an important requisite. The IPS guidelines[(4)], mandates a vision of 6/6 to 6/9 in the better eye and UCVA of 6/12 to 6/9 in the other eye and they also limit the amount of refractive error not to be greater than 4.0D of hypermetropia or myopia. In our study police officers below the age of 40, 91.3% had 6/6 vision but this dropped to 88.6% and 50.7% in the age groups of 41-50 1nd 51-60 respectively. This could be due to increasing age, associated with nuclear sclerosis of natural lens thus resulting in a refractive error. However these individuals had a good BCVA of 6/6 which was 100% in individuals below 40years and 96.8% and 92.8% with declining age groups. This emphasizes the need for regular eye check up especially after the age of 40 years so that the corrected visual acuity meets the required standards and hence these individuals do not pose a threat to themselves or to their fellow officers during the execution of their duties.

Near vision is the ability to look at objects at a distance of 33 cm and the examples of near vision performance for a police officer include tasks such as reading the penal code and identifying the photographs of suspects. The uncorrected near vision is not usually checked, as there would be very few situations that a police officer would have the need for uncorrected near vision. The IPS guidelines mention the near vision requirement of J1 and J2. In our study corrected near vision was above 94.5% in all age groups.

Color vision refers to discrimination between various colors. Basic color discrimination is required in identifying different colored clothing, traffic signals and identifying color of cars. Color vision testing is done by Ishihara's test, which recognizes congenital deficiency. IPS guidelines mandates a good color vision and eliminates most with color deficiency at the time of recruitment. In the current study 99.4% of the study subjects had normal color vision due to stringent color vision standards during recruitment.

The important aspect to note in this study is above 40 years individuals are likely to develop lifestyle disorders such as diabetes mellitus and hypertension. Diabetic individuals had a higher likelihood of having poor vision due to diabetic retinopathy and hence these individuals required a more frequent follow up to ensure good vision in them.

The age above 40 years also increases the chances of the nuclear sclerosis and cataract formation and thus

reducing vision, which is a reversible visual loss and only requires regular screening and adequate management in terms of refractive correction or cataract surgery. This emphasizes the need for regular screening and appropriate management of the police personnel during their professional career in order to ensure the maintenance of the required standards of visual abilities.

Conclusion

Good visual health is a critical function in those working in the law enforcement. The individuals are recruited after stringent tests hence the individuals do have good visual health. However with increasing age and due to possible risk of injury these individual may have reduced vision over a period of time, which may hinder their duties. They require a regular screening and correction whether by optical or surgical methods to ensure the maintenance of the visual standards. Individuals with diabetes and hypertension require a more frequent screening and appropriate intervention.

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