Original Article

Diabetic Retinopathy in Army Personnel

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Background: Diabetes retinopathy is a major, chronic, devastating complication of diabetes. Misunderstanding, inadequate knowledge, and poor control of blood sugar level lead to rapid disease progression resulting in worsening visual acuity and permanent visual loss. Military personnel getting diabetes retinopathy would affect the defensive power, reducing the country endurance.

Objective: To study the prevalence and risk factors of diabetic retinopathy in army personnel.

Materials and Methods: The present study was a cross-sectional study. Army personnel with diagnosis of diabetes mellitus were randomly selected from the outpatient unit of the department of medicine, Phramongkutklao hospital. Questionnaire was performed and fundus findings were recorded.

Results: Three hundred eighty-five subjects were enrolled, of which 332 (86.23%) were male. Mean age was 53.18±5.49. Blurred vision was found in 69.48%. Prevalence of diabetic retinopathy was 23.28%. Male and duration for 9.35±5.37 years after being diagnosed with diabetes mellitus are risk factors for development of diabetes retinopathy with OR 5.08 (1.68 to 15.32) and 1.09 (1.03 to 1.15), respectively ($p<0.05$).

Conclusion: Prevalence of diabetic retinopathy in the Army personnel is within range of the worldwide population, which is lower than in the Thai-population.

Keywords: Diabetic retinopathy, Military personnel

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Diabetes Mellitus is epidemic worldwide owing to the increasing number of aging population and globalization. The World Health Organization (WHO) predicted a doubling in the number of diabetic patients in the next twenty years especially in developing countries in Asia. Increased calorie intake and sedentary lifestyle are the reasons for abdominal obesity, which support the development of diabetes mellitus[1,2].

According to previous studies, the prevalence of diabetic retinopathy worldwide ranges from 17% to 30%[3-5]. Additionally, a large Thai population-based study found the prevalence of diabetic retinopathy at about 31.4%[6].

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Thailand is inevitably moving towards the burden of such a public health problem. According to the cross-country survey in the Inter Asia study, the prevalence of type 2 diabetes in Thailand was 9.8 percent, which doubled the number forecasted by the WHO. Hyperglycemia causes diabetic retinopathy and nephropathy. Those are the microvascular complications that are the leading causes of blindness and chronic renal failure. In addition to hyperglycemia itself, diabetic patients also bring other components of the so-called metabolic syndrome, i.e., hypertension, dyslipidemia, abdominal obesity, and consequently cardiovascular diseases. Both microvascular and macrovascular complications are the burden of the disease not only in terms of individual health and well-being but also in having an impact on the economic status of their families and the country.

Phramongkutklao Hospital is a largest tertiary care hospital of the Royal Thai Army. It aims for disease treatment and prevention. Military personnel play an important role for the defense of the nation.

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When military personnel are diagnosed with diabetes mellitus developed complications such as retinopathy, it could result in decreased visual function and vision lost. Therefore, good compliance in blood sugar control and understanding the need for regular eye checkup are key for early complication detection and prevention.

Objective

The objective was to study the prevalence of diabetic retinopathy and associated risk factors for development of diabetic retinopathy in diabetic army personnel.

Materials and Methods

The present study was approved by Institutional Review Board of Royal Thai Army Medical Department. The sample size was calculated using the prevalence of diabetic retinopathy in Thai population (31.4%) as basis[6]. Three hundred thirty-one army personnel should be enrolled.

The present was a cross-sectional study. Army personnel with diagnosis of diabetes mellitus were randomly drawn from the outpatient unit, Department of Medicine, Phramongkutklao Hospital. Informed consent was completed. Fundus examination was done by indirect ophthalmoscope and severity of diabetic retinopathy was grading by Early Treatment of Diabetic Retinopathy Study (ETDRS) standard picture. Questionnaires were self-administered and knowledge data about diabetic retinopathy were fulfilled. In case of reading problem, the examiner would read and help fill the data.

Statistical analysis

Continuous data were reported as mean and standard deviation. Univariate and multivariate analysis were used to determined associated risk factors for developing diabetic retinopathy. A p-value lower than 0.05 was considered significant.

Results

Three hundred eighty-five controlled diabetes mellitus subjects were enrolled and included 332 males (86.23%) and 53 females (13.77%). The mean age was 53.18±5.49 as shown in Table 1. According to the questionnaire, 30.52% of respondent had blurred vision and 92.86% were aware of diabetic mellitus, as shown in Table 2 and 3, respectively. The prevalence of diabetic retinopathy was 23.28%.

Prevalence of diabetic retinopathy in military personnel in Phramongkutklao Hospital are categorized as shown in Table 4.

Using univariate analysis, sex gender, diastolic

Table 1. Baseline characteristics

	Total (n = 385) n (%)
Sex	
Male	332 (86.23)
Female	53 (13.77)
Underlying disease	
Hypertension	288 (75.20)
Dyslipidemia	259 (67.80)
Ischemic heart disease	4 (1.04)
Age (year), Mean±SD	53.18±5.49
Duration of DM (year), Mean±SD	8.06±4.88
FBS (mg/dL), Mean±SD	149.47±49.76
HbA1C (%), Mean±SD	7.61±1.58

SD=standard deviation; DM=diabetes mellitus; FBS=fasting blood sugar

Table 2. Visual symptoms

	Yes (%)
Blurred vision	30.52
Floaters	2.45
Flashing	0.00
Metamorphopsia	0.00

Table 3. Knowledge

Questionnaire	Yes (%)	No (%)	Don't know (%)
Awareness of diabetes mellitus	92.86	7.14	0.00
Know what is diabetic retinopathy	50.00	44.18	5.82
Good control blood sugar prevent diabetic retinopathy progression	81.75	11.11	7.14
Laser treatment is one choice of treatment in diabetic retinopathy	31.48	2.38	66.14
Poor diabetic retinopathy control lead to blindness	94.18	3.44	2.38
Control HT/DLP also prevent diabetic retinopathy progression	54.23	7.94	37.83
Doctor tell patient eye status and follow-up period	88.10	7.14	4.76

HT=hypertension; DLP=dyslipidemia

blood pressure, and duration of diabetes mellitus are statistically significant risk factors for having diabetic retinopathy. In addition, according to the questionnaires, the authors found that un-awareness of diabetes mellitus and poor control of blood sugar level are significant factors for the development of diabetic retinopathy.

Table 4. Diabetic retinopathy grading

Diabetic retinopathy grading (n = 385)	Percentage
No diabetic retinopathy	76.72
Mild non-proliferative diabetic retinopathy	8.20
Moderate non-proliferative diabetic retinopathy	5.56
Severe non-proliferative diabetic retinopathy	0.26
very severe non-proliferative diabetic retinopathy	0.26
Inactive proliferative diabetic retinopathy	7.14
Active proliferative diabetic retinopathy	1.85

Multi-variated analysis was performed. The authors found that only male and duration of diabetes mellitus are associated as risk factors for development of diabetic retinopathy as shown in Table 5.

Discussion

As the authors compared with previous studies, the prevalence of diabetic retinopathy in military personnel was lower than the prevalence in the large Thai population-based survey[6]. Chinese literature similarly found a lower prevalence of diabetic retinopathy in retired military people compared to the general population[7]. This may be explained by many reasons. First, our populations were from hospital-based data so they might have better concern regarding health awareness towards chronic disease and complication. Second, the military personnel have an active and healthy lifestyle so over seventy percent of them could control their blood sugar under the recommended guideline.

The risk factor for development of diabetic retinopathy in our study were similar to the national-

Table 5. Risk factors and development of diabetic retinopathy

	No DR (n = 290) n (%)	DR (n = 88) n (%)	OR (95% CI)		p-value
			Crude OR	Adjusted OR	
Sex			4.27 (1.50 to 12.19)	5.08 (1.68 to 15.32)	0.004
Male	241 (74.15)	84 (25.85)			
Female	49 (92.45)	4 (7.55)			
Age (year)	53.21±5.44	52.93±5.79	0.99 (0.95 to 1.04)	0.96 (0.92 to 1.01)	0.137
Awareness of DM			8.63 (1.15 to 64.57)	6.091 (0.71 to 52.11)	0.099
Yes	259 (75.07)	86 (24.93)			
No	26 (96.30)	1 (3.70)			
Controlled DM			3.18 (1.40 to 7.23)	2.42 (0.95 to 6.14)	0.063
Yes	223 (73.60)	80 (26.40)			
No	62 (89.86)	7 (10.14)			
BW (kg)	77.86±16.11	74.67±15.65	0.99 (0.97 to 1.00)	0.98 (0.96 to 0.99)	0.009
BP (mm/Hg)			1.62 (0.92 to 2.84)	1.30 (0.67 to 2.50)	0.440
≤140/80	238 (78.55)	65 (21.45)			
>140/80	52 (69.33)	23 (30.67)			
Duration of DM (year)	7.65±4.65	9.35±5.37	1.07 (1.02 to 1.12)	1.09 (1.03 to 1.15)	0.002
FBS (mg/dL)			1.14 (0.70 to 1.86)	1.00 (0.57 to 1.76)	0.990
≤130	103 (75.18)	34 (24.82)			
>130	186 (77.50)	54 (22.50)			

DR=diabetic retinopathy; OR=odds ratio; CI=confidence interval; DM=diabetes mellitus; BW=body weight; BP=blood pressure; FBS=fasting blood sugar

based Wisconsin Epidemiologic Study of Diabetic Retinopathy (WESDR) study, which is the duration of diabetes mellitus[4]. No exact mechanism was postulated for the pathogenesis of the diabetic retinopathy and the duration of diabetes mellitus. The glycosylated hemoglobin may affect the endothelium of the blood vessels that lead to the occlusion and ischemia of the retinal capillary[8].

Male was also risk factor for development of diabetic retinopathy in the present study. There is controversy in previous studies for gender to be a risk factor. According to WESDR study, white-male gender is an independent risk factor for diabetic retinopathy[4]. Ethnicity may be involved. The Los Angeles Latino Eye Study in Latin and one study in India show significant risk in male gender. Anyway, other studies from another ethnicity shows a significant risk factor in gender. Further study is required for conclusion.

In clinical application, the authors realized that most subjects did not know general information about diabetic retinopathy. They did not know that laser treatment was one choice of therapy if they had proliferative diabetic retinopathy. Additionally, they did not know that good control of blood pressure and blood lipid level could delay diabetic retinopathy progression. Therefore, encouragement about these aspects of knowledge should be done for better outcome of the treatment in this chronic disease.

Conclusion

Prevalence of diabetic retinopathy in Army personnel is within range of the worldwide population, which is lower than the Thai-population based.

What is already known on this topic?

Diabetic retinopathy develops naturally on the epidemiological nature in diabetic patient.

What this study adds?

A good control of diabetes may delay diabetic retinopathy progression development and its severity.

Conflicts of interest

The authors declare no conflict of interest.

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