Prevalence of Diabetic Retinopathy in Relation to Duration of Diabetes Mellitus in Community Hospitals of Lampang

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Three thousand and forty nine patients diagnosed with diabetes mellitus were examined in 13 community (district) hospitals in Lampang from January to December 2002. Complete eye examination with standard protocol was used to determine the prevalence and severity of diabetic retinopathy. The prevalence of the background or non-proliferative diabetic retinopathy (BDR or NPDR) was 18.9% and proliferative diabetic retinopathy (PDR) was 3% in all age groups. For the relationship of the duration of diabetes, it showed that the longer the duration of diabetes the higher the prevalence of diabetic retinopathy. In BDR or NPDR, the retinopathy varied from 13.11 to 22.91% in persons having diabetes for less than 10 years and up to 42.86% in those with diabetes for up to 20 years. In the PDR group, the prevalence was 2.15 to 2.42% in persons with diabetes for less than 10 years and up to 10.20% for those with diabetes for up to 20 years. The severity of retinopathy was found to be not only related to a longer duration of diabetes but also related to higher glycosylated hemoglobin levels, higher systolic blood pressure and the presence of proteinuria.

Keywords : *Diabetic retinopathy (DR), Background diabetic retinopathy (BDR), Proliferative diabetic retinopathy (PDR), Community hospitals, Prevalence, Duration*

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According to a study of the Thai working group on the burden of disease and injuries in Thailand[1], it was found that diabetes is more prevalent among Thai people and led to more complications and morbidities (Table 1). The cohort study conducted by Wisconsin Epidemiologic Study of Diabetic Retinopathy group[2] (WESDR) a study of almost 14 years in 634 patients diagnosed with diabetes mellitus, it was found that the diabetic patients who were at risk of having the complication of diabetic retinopathy or "DR" were patients who suffered from the diabetes for a long time. Moreover, these complications were found in older people, and patients with associated diseases (co-morbidity) such as higher systolic blood pressure, the presence of proteinuria and higher glycosylated hemoglobin levels (measured by Hb A_1C level). It could be said that the result of this study was correlated with other epidemiologic studies which have been previously reported[3,4]. However, there were a few studies on DR in Thailand which mostly studied clinics based in the university or provincial hospitals [5-9]. The Department of Ophthalmology of Lampang Hospital, therefore, conducted a different study to find out the prevalence of DR in diabetic patients in the Diabetic Clinic in every community hospital in Lampang province. The purpose of the present study was to determine the prevalence of diabetic retinopathy which was non-proliferative or background diabetic retinopathy ("NPDR" or "BDR") and proliferative diabetic retinopathy ("PDR") and to find out the relationship between the duration of diabetes mellitus and its complication of diabetic retinopathy.

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Material and Method

This study was conducted from January to December 2002 by sending out a mobile eye team from the Department of Ophthalmology, Lampang Hospital to every community hospital in Lampang province. The team was composed of an ophthalmologist, ophthalmic nurses, ophthalmic assistants and a driver. This team visited diabetic clinics of every community hospital except community hospitals located near Lampang Hospital which were in Muang District, Koh Kah District and Hangchatr District which would be send their diabetic patients to Lampang Hospital to have an eye examination. After medical examination and treatment for diabetes in the diabetic clinic of each community hospital, the patients would be asked to have a comprehensive eye examination by the mobile eye team via the arrangement of the voluntary health workers, sub-district and district health officers of Provincial Health Bureau, Lampang province as scheduled.

Before an eye examination, the ophthalmic nurses would give preliminary information on the health study regarding the duration of diabetes and its complications especially diabetic retinopathy to the patients. Eye health education and prevention of blindness from diabetes were stressed to the community health personnel, diabetic patients and their relatives. Then the patients would receive a comprehensive eye examination composed of visual acuity check, refraction, intraocular pressure measurement, slitlamp bio-microscopic examination, fundus examination with pupillary dilatation by Mydriacyl 1% and Phenylephrine 10% (in case of normotension) in order to examine its diabetic retinopathy in detail. Any patients with shallow anterior chamber or occludable anterior chamber angle were given an appointment for gonioscopy and LASER peripheral iridotomy in Glaucoma clinic of Lampang Hospital before papillary dilatation. After complete eye examination, any patient found to have diabetic retinopathy that required treatment would be given an appointment for LASER treatment and/or Pars plana vitrectomy with endolaser photocoagulation. For those who had other eye diseases which needed to be cured such as cataract, glaucoma, trichiasis and pterygium would be referred to Lampang Hospital for further treatment without having to pay.

Results

The study was conducted among 3,049 patients of which 838 were male and 2,211 were female (Table 2). After the comprehensive eye examination, it was found that 2,382 patients representing 78.12% had non-diabetic retinopathy. Among the patients, 21.87% were found to have diabetic retinopathy or DR (Table 3). While 18.89% were diagnosed with NPDR or BDR and 2.89% with PDR.

Moreover, the result revealed that the prevalence of diabetic retinopathy was correlated to the duration of diabetes of the patients. Therefore, in cases where the patients suffered from diabetes less than 5 years, 15.26% of the patients would have a chance to have ophthalmic complications in diabetes. It also revealed that the patients had suffered from diabetes for 15-20 years, the prevalence of diabetic retinopathy would increase to 53.06% and it was likely to develop to PDR type of 10% (Table 4, 5). Furthermore, it was also found that only 9% of the examined patients were those who suffered from diabetes more than 20 years and 33.34% of them were found to have diabetic retinopathy and 6.67% were PDR. It could be said that this number decreased when compared to the patients who had had diabetes for more than 15-20 years. However, since a small number of elderly

Table 1. Incident and prevalent of diabetes in Thailand in 1999

Age group (Year)	Incidence				Prevalence			
	Male		Female		Male		Female	
	IDDM	NIDDM	IDDM	NIDDM	IDDM	NIDDM	IDDM	NIDDM
0-4	5	-	5	-	15	-	15	-
5-12	180	635	171	625	1,018	1,778	1,005	1,791
15-29	368	9,425	368	10,091	5,714	82,338	5,557	77,845
30-44	132	18,349	139	29,154	8,013	237,776	8,247	333,094
45-59	-	25,508	-	28,954	4,515	404,094	4,865	526,177
60-69	-	3,841	-	2,580	1,534	215,420	1,788	261,937
70-79	-	613	-	1,165	551	97,902	630	118,021
More than 80	-	163	-	438	96	21,626	125	32,136
Total	685	58,534	683	73,007	21,456	1,060,934	22,232	1,351,001

Table 2. Age and sex of samples in diabetic clinic in community hospitals of Lampang

Age group (Year)	Male	Female	Total
0-10	-	1	1
11-20	1	3	4
21-30	4	20	24
31-40	47	150	197
41-50	138	560	698
51-60	247	649	896
61-70	284	606	890
> 70	105	185	290
Not record	12	37	49
Total	838	2,211	3,049

Table 3. Result of diabetic retinopathy survey in 13 community hospitals in Lampang

Community Hospital (District)	Number of diabetic Patients with eye exam	No DR	NPDR	DR PDR	Total
Muang	633	400	196	37	233
Maemau	104	82	20	2	22
Kaukha	171	131	35	5	40
Serm-ngam	236	211	22	3	25
Ngao	172	137	32	3	35
Jaehom	238	200	30	8	38
Wangnua	266	231	34	1	35
Thurn	281	218	53	10	63
Maeprik	156	129	25	2	27
Maetha	411	317	80	14	94
Sobprab	277	250	22	5	27
Hangchatr	30	17	12	1	13
Muang pan	74	59	15	0	15
Total	3,049 (100%)	2,382 (78.12%)	576 (18.89%)	91 (2.89%)	667 (21.87%)

patients attended the eye examination it may be due to the short life expectancy of these diabetic group from poorly controlled diabetics and other co morbidity, it could not draw any conclusion of the prevalence of diabetic retinopathy from this group.

Discussion

According to a study on the prevalence of diabetic retinopathy in the 13 community hospitals conducted in Lampang, it revealed that this study generated the same result when compared to a study conducted in 8 community hospitals by the study group of Maharaj Hospital, Nakorn Ratchasrima (Table 6)[5]. As for the clinic based study in Maharaj Chiengmai Hospital[6] which is a medical school, it was found that the prevalence of PDR was 5.2% compared to 4.5% in a clinic based in Chonburi Hospital[7] which is the regional hospital in a major province in the Central part of Thailand. It could be explained that the University and Regional hospitals would have a higher prevalence of PDR which were more serious than NPDR because they accepted patients who have been referred from the nearby provinces for LASER treatment and vitreoretinal surgery for DR.

As for the study in a provincial hospital in Thailand, there has been only one study conducted in Trang province[8]. The result of the prevalence of NPDR or BDR was marginally different when compared to community hospitals in Lampang and Nakorn Ratchasima[5]. Therefore, it could be concluded that the prevalence of complications in diabetic retinopathy in Thailand according to NPDR or BDR types was 12-25% while PDR type was 1.9%-5.2% respectively depending on clinical or community based. When compared to the study conducted by a physician group from 1981 to 1990, it was found that the result of each study was completely different according to different criteria of diagnosis. However, the study indicated the same results of vascular complication (Table 7)[9].

Table 4. Duration of diabetes in samples with diabetic retinopathy complication in community hospitals in Lampang

Duration of Diabetes (Year)	No diabetic retinopathy (No DR)		Non-proliferative diabetic retinopathy (NPDR)		Proliferative diabetic retinopathy (PDR)		Total
	Male	Female	Male	Female	Male	Female	
< 5	433	1,028	64	162	10	27	1,724
5-10	154	462	39	150	8	12	825
10-15	44	115	32	73	4	13	281
15-20	6	17	7	14	2	3	49
> 20	8	12	1	5	0	2	30
Total	645	1,634	143	406	24	57	2,909*

* Some patients have no record of duration of diabetes

Table 5. Prevalence of diabetic retinopathy and duration of diabetes in 13 community hospitals in Lampang

Duration (years)	Non-proliferative diabetic retinopathy (NPDR)		Proliferative diabetic retinopathy (PDR)	
	Number	Percent	Number	Percent
< 5	226/1,724	13.11%	37/1,724	2.15%
5-10	189/825	22.91%	20/825	2.42%
10-15	105/281	37.37%	17/281	6.05%
15-20	21/49	42.86%	5/49	10.20%
> 20	8/30	26.67%	2/30	6.67%

Moss et al[10] conducted a study to monitor patients diagnosed with diabetes for more than 14 years. The study revealed that 8% of the patients with PDR would lose their vision in one eye. In patients who had high risk characteristics (DRS-HRC)[11], approximately 10% of the patients would lose their vision in both eyes and almost 40% would lose vision in one eye from the retinopathy. Moreover, only 40% of the HRC patients were receiving eye treatment.

As suggested by the American Academy of Ophthalmology[12], patients aged more than 12 years old diagnosed with Type 1 diabetes (Insulin dependent diabetes) for more than 5 years duration should get a comprehensive eye examination at least once a year. During the eye examination, the visual acuity measurement and pupillary dilatation should be given to them since they have a high risk of developing retinopathy. However, the study conducted by Lampang Hospital found that the number of diabetic patients aged less than 20 years old was slightly limited. As a result, the conclusion on the prevalence of diabetic retinopathy in Type 1 patients could not be drawn. Nevertheless, it could be said that the prevalence of diabetic retinopathy varied from 15.26% to 25.33% in patients with diabetes for less than 5 years up to 10 years.

According to the patients' interviews and medical records reviewed, the result revealed that the diabetic patients who were diagnosed with any comorbidity of high blood pressure, the presence of proteinuria as well as retinopathy should be closely supervised and monitored. This was because they were at risk of developing PDR and macular edema which sometimes the severity of retinopathy did not relate only to longer duration of diabetes. However, the study of Diabetic Control and Complication Trail[13] confirmed that there was a direct correlation between

Table 6. Diabetic retinopathy studies in Thailand

	Chieng Mai[6]	Chonburi[7]	Nakorn Ratchasima[5]	Trang[8]	Lampang
Year of Study	1990	1991	1994	1996	2002
Number of examined diabetic patients	233	198	842	988	3,049
Method of Study	University Hospital Eye Clinic	Regional Hospital Eye Clinic	District Hospital (Total 8)	Provincial Hospital Eye Clinic	District Hospital (Total 13)
Prevalence of					
Non proliferative DR	12.0%	25.3%	19.2%	18.7%	18.9%
Proliferative DR	5.2%	4.5%	2.6%	1.9%	3.0%

Table 7. Reported prevalence of vascular complication in Thai diabetics[9]

Year of report	1981	1982	1987	1989	1989	1990
Center	Siriraj	Chula	Chula	Rajvithi	Siriraj	Srinagarind Khon Kaen
No. of cases	500	469	564	1,171	310	207
Prevalence (%)						
Hypertension	48.0	29.9	-	29.7	40.6	22.2
Coronary heart disease	9.6	15.6	-	12.4	-	22.2
Cerebrovascular disease	0.8	15.1	-	-	-	8.2
Gangrene, Peripheral vascular disease	0.8	1.1	-	-	-	21.3
Retinopathy	21.4	3.2	42.02	23.8	31.5	25.1
Nepropathy	8.6	17.1	-	11.2	9.7	12.5*

*Excluding renal insufficiency only

the glycemic control and the diabetic retinopathy which caused vision loss. Therefore, it could be concluded that the patients, who were able to decrease the HbA_1C level could consequently reduce the risk of having PDR and macula edema.

Though the treatment of DR is for blindness prevention, it could not improve the visual acuity of the patients, In terms of vision protection, it would be more effective to prevent the development of DR (before the history of blurred vision) than to save the rest of the visual acuity. As a result, the ophthalmologists should inform their patients how important the relationship of the duration is and the severity of diabetic retinopathy which has been found. Moreover, the ophthalmologists should inform the community physicians, the general practitioners and the endocrinologists to pay special attention to eye examinations of their patients besides diabetic treatment or blood sugar control. Furthermore, community physicians, general practitioners or endocrinologists should send their patients to have an eye check up periodically since there were a large number of patients with high risk characteristics who had never had LASER surgery. In addition, some patients in community hospitals have never received an eye examination from the ophthalmologists. Even in the USA[14], in the case where treatment of diabetic patients have been monitored for 10 years, there were only 64% of the total patients received the eye examination by dilating the pupil for fundus examination.

To reduce blindness from diabetic retinopathy, the patients should consistently get health education for eye examination as a clinical practice guideline [15]. General practitioners in the community hospitals should also educate risk of diabetic retinopathy. Moreover, in Thailand where the eye clinics in government hospitals are overloaded, the mobile eye teams should visit the community hospitals in order to screen the diabetic patients prior to their serious eye complications and send them to an eye clinic in provincial and/or regional hospitals. In addition, the technology for screening and referral of diabetic retinopathy should be standardized and appropriate for each community according to the clinical practice guidelines in Thailand [15]. As suggested by the American Academy of Ophthalmology[12], LASER photocoagulation should be done for the treatment of diabetic retinopathy.

According to the report of ETDRS[16], there were 14% of the patients with diabetic macular edema who had LASER photocoagulation and still lost their vision. As a result, the government sector should provide LASER equipment to all regional hospitals or at least to cover all retinal clinics of government hospital for easy accessibility of the diabetic patients not to waste their time traveling and waiting in a long queue at hospitals in Bangkok or university hospitals. As for the fee charge for the LASER surgery, it should be the rate that the patients can afford. Moreover, this service should cover the elderly and the poor. Furthermore, if ophthalmologists in the hospitals with LASER machines are too busy and could not serve all the patients, the ophthalmologists in the nearby hospitals without the LASER equipment should have an effective management to handle the problem by conducting photocoagulation for the patients by themselves. In addition, brush-up training or a refresher course on new technology of LASER should be given to ophthalmologists who used to have training on its usage but forgot how to use it properly in order to update them on the new scientific knowledge.

After the LASER surgery has been given to the patients diagnosed with diabetic retinopathy with high risk characteristics, the ophthalmologists should explain to the patients that LASER photocoagulation could prevent blindness but not permanently cure the disease. Though, the patients could have LASER surgery many times and get better diabetic control; however, it did not improve the visual acuity of the patients. In addition the ophthalmologists should educate them on the necessity of strict control of diabetes and other associated diseases such as high blood pressure, and nephropathy because at present [17], there is no drug to improve the condition of diabetic retinopathy.

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ความชุกของเบาหวานในจอประสาทตาในโรงพยาบาลชุมชนของจังหวัดลำปาง

วัฒนีย์ เย็นจิตร, สมชาย สมัยพร, ประธาน เลิศมีมงคลชัย, ทวีศักดิ์ จงวิริยานุรักษ์, พงษ์ศักดิ์ อนุจารี, ดารณี ชยาบูรณ์, อภิวัฒน์ โพธิกำจร

กลุ่มจักษุแพทย์ได้ไปตรวจผู้ป่วยเบาหวาน จำนวน 3,049 คนในโรงพยาบาลชุมชน 13 แห่งของจังหวัดลำปาง ตั้งแต่เดือนมกราคม-ธันวาคม 2545 เพื่อคัดกรองหาเบาหวานในจอประสาทตาตามเกณฑ์ของ American Academy of Ophthalmology ผลการศึกษาพบว่า ความชุกของเบาหวานในจอประสาทตาชนิด Non-proliferative หรือ Background diabetic retinopathy หรือ NPDR(BDR) เป็นร้อยละ 18.9 และ Proliferative diabetic retinopathy (PDR) เป็นร้อยละ 3 เมื่อเทียบกับระยะเวลาที่เป็นเบาหวานนานพบว่าผู้ป่วยที่เป็นเบาหวานนานมีโอกาสพบโรคแทรกซ้อนใน จอประสาทตามากขึ้น โดยพบ NPDR ร้อยละ 13.11, 22.91, 37.37, 42.68 และ PDR ร้อยละ 2.15, 2.42, 6.05 และ 10.20 ใน ผู้ป่วยที่เป็นเบาหวานน้อยกว่า 5 ปี, 5-10 ปี, 10-15 ปี และ 15-20 ปี ตามลำดับ เนื่องจากผู้ป่วยที่เป็นเบาหวานนานกว่า 20 ปีมาตรวจตาเป็นจำนวนน้อยจึงไม่สามารถสรุปผลได้แน่นอน และสรุปได้ว่าความรุนแรงของเบาหวานในจอประสาทตานอกจากจะแปรผันตามระยะเวลาที่เป็นเบาหวานแล้ว ยังแปรผันตามระดับความดันโลหิต การตรวจพบ น้ำตาลในปัสสาวะ และอายุของผู้ป่วยร่วมด้วย