A Survey Study on Diabetes Management and Complication Status in Primary Care Setting in Thailand

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Objective: *Healthcare service in Thailand is stratified into three levels with different facilities of care. This cross-sectional survey study described diabetes management, diabetes control, and late complication status among patients managed in urban primary health care clinics.*

Material and method: *Thirty-seven primary health care units were randomly selected. Each unit enrolled up to 30 patients having been managed in the unit for at least one year. The patients were interviewed, and the medical records such as demographic data, management practice, glycemic control, and complications were retrospectively reviewed for a period of one year. All data were entered in the case record forms, transferred into a database by electronic scanning, and analyzed by SAS version 6.12. One thousand and seventy-eight patients, including 300 males and 778 females, were recruited in the present study.*

Result: *Their mean $\pm$ SD of age, onset age, and diabetes duration were 58.2 $\pm$ 11.3, 52.2 $\pm$ 11.4 and 6.2 $\pm$ 4.0 years, respectively. Six percent of the patients were type 1, and 94% were type 2 diabetes. Two-thirds of the patients engaged in diabetes education $\geq$ 5 days during the previous year. Monitoring of glycemic control was largely by measurement of fasting plasma glucose (FPG) in the unit. Determination of hemoglobin A_{1c} (HbA_{1c}), total cholesterol, triglyceride, HDL-cholesterol, serum creatinine, urinary protein, and microalbuminuria were observed in 0.7, 17.4, 11.7, 6.9, 38.2, 33.0, and 0.9% of the patients, respectively. Mean $\pm$ SD of FPG was 8.3 $\pm$ 2.7 mmol/l, and HbA_{1c} was 8.6 $\pm$ 1.9%. The percentage of patients with FPG < 6.7 mmol/1 and HbA_{1c} < 7% were 28.7 and 19.6%, respectively. An annual eye and foot examination was performed in 21.5% and 45% of the patients, respectively. The prevalence of late complications included retinopathy (13.6%), proteinuria (17.0%), end stage renal failure (0.1%), peripheral neuropathy (34%), acute foot ulcer/gangrene (1.2%), healed foot ulcer (6.9%), stroke (1.9%), and myocardial infarction (0.7%).*

Conclusion: *The present study results demonstrated that necessary, routine assessments were not regularly practiced by caregivers in primary care units. In addition, peripheral neuropathy was the most common observed complication and this might explain the high rate of foot ulcers in this cohort.*

Keywords: *Diabetes mellitus, Primary healthcare, Treatment, Diabetic complications, Thailand*

J Med Assoc Thai 2007; 90 (1): 65-71
Full text. e-Journal: *http://www.medassocthai.org/journal*

Diabetes mellitus (DM) is a common chronic disease with increasing burdens in Thailand. The prevalence of diabetes in Thai adults aged 35 years or older rose to 9.6% during the year 2000[1]. However, the DM patterns remain unchanged from a previous survey [2] in that it is more prevalent in female groups and especially in urban areas. Diabetes frequently affects the population aged 45 years and older[1].

Diabcare-Asia (Thailand) is a part of Diabcare-Asia Project[3] designed to gather the data on diabetes management and outcomes in Asia. The Diabcare-Asia (Thailand) surveys in 1997 and 1998 demonstrated that diabetic care and control were sub-optimal in more

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than one half of the patients attending diabetic clinics in 26 secondary/tertiary care hospitals around the country[4,5]. Meanwhile, the data on diabetes care management outcomes and complications in primary care settings are not yet available. This Diabcare-Asia (Thailand) survey in 2001 was designed to describe the diabetes management and control as well as late complication status in the patients with DM managed in primary health care units in urban areas.

Material and Method

Study design

A cross-sectional survey study was designed by Diabcare-Asia Steering Board[3], consisting of representatives from national diabetes association in each participating country, International Diabetes Federation, WHO Collaboration Center, Australia and Medical Director of Novo Nordisk Asia Pacific Center.

Eight provincial hospitals were randomly selected to represent each of the four regions in Thailand. In the vicinity of each provincial hospital, 4-5 district hospitals providing primary health care service were invited to participate in the present study. An investigator meeting was set up for each region to provide understanding and clarification on data entering in the case record form. The technique of collecting capillary blood for measurement of hemoglobin A_{1c} (HbA_{1c}) was demonstrated and practiced.

Study population and data collection

Each participating unit enrolled up to 30 diabetic patients who had been under care in the unit for at least one year. Simple randomization was used for the enrollment. The patients were interviewed for diabetes education exposure and self-care pattern. Their medical records including demographic data, management practice, glycemic control, and existing recorded complications were retrospectively reviewed for one year. The definitions were described in the previous publication[4] and criteria of control were based on the published recommendations[6,8]. There were no special tests done in the present study, except blood samples by finger prick at the recruitment for HbA_{1c} measurement. HbA_{1c} was determined by Bio-Rad assigned central laboratory, using automated high-pressure liquid chromatography. All samples were stored at 2-8^{o}C and mailed by batches to the appointed central laboratory. All data were entered in the case record forms.

Statistical analysis

The data in the case record forms were transferred to a database (Microsoft Excel) by electronic scanning (Teleform Elite, version 7; Cardiff Software Inc, SAS Institute Inc, Cary, USA). All data and statistical analysis were performed at Novo Nordisk Asia Pacific Center. Descriptive statistics were used to describe the findings.

Results

One thousand and seventy-eight patients were recruited from 37 sites, including 300 males and 778 females. Their mean $\pm$ SD (range) of age, onset age and diabetes duration were 58.2 $\pm$ 11.3 (13-86), 52.2 $\pm$ 11.4 (8-83) and 6.2 $\pm$ 4.0 (2-42) years, respectively. Six percent of the patients were type 1, and 94% were type 2 diabetics. The mean $\pm$ SD of body mass index (BMI) was 24.4 $\pm$ 4.1 kg/m^2. Overweight, BMI 23.0-24.9 kg/m^2 and obesity, BMI $\geq$25.0 kg/m^2 were noted in 24.3% and 39.2% of the patients, respectively. Current cigarette smoking was observed in 12.1%; meanwhile, regular alcohol drinking was noted in 5.8% of the patients.

Two-thirds of the patients engaged in diabetes education $\geq$ 5 days in the previous year. It was noted that 28.9% of the patients followed diet instruction regularly, and 17.2% did exercise on a regular basis. None of the patients performed self-blood glucose monitoring. Urine testing for glucose at home was observed in 0.2% of the patients. Monitoring of glycemic control was largely done by measurement of fasting plasma glucose (FPG) at the clinics where the patients attended. The mean $\pm$ SD times of FPG measurement per years was 9.8 $\pm$ 2.1, with a range of 2-22 measurements per year. Determination of HbA_{1c}, total cholesterol, triglyceride, HDL-cholesterol, serum creatinine, urinary protein, and microalbuminuria were observed in 0.7, 17.4%, 11.7%, 6.9%, 38.2%, 33.0%, and 0.9% of the patients, respectively. Fundoscopic and foot examinations were performed in 21.5% and 45.0% of the patients, respectively (Fig. 1).

The mean $\pm$ SD of fasting plasma glucose was 8.3 $\pm$ 2.7mmol/l and HbA_{1c} measured by the central laboratory was 8.6 $\pm$ 1.9%. The percentage of patients with optimal glycemic control FPG < 6.7 mmol/1 and HbA_{1c} < 7% were 28.7% and 19.6%, respectively. Uncontrolled diabetes, FPG > 7.8 mmol/1 and HbA_{1c} > 8% were noted in 53.5% and 58.1% of the patients, respectively (Fig. 2). Hypertension, blood pressure $\geq$ 140/90 mmHg or use of antihypertensive drug(s) was found in 37.3% of the patients. The frequently prescribed antihypertensive drugs were diuretic and angiotensin converting enzyme inhibitor in 55.7 and 38.0% of the prescribed treatment, respectively (Fig. 3). Serum total

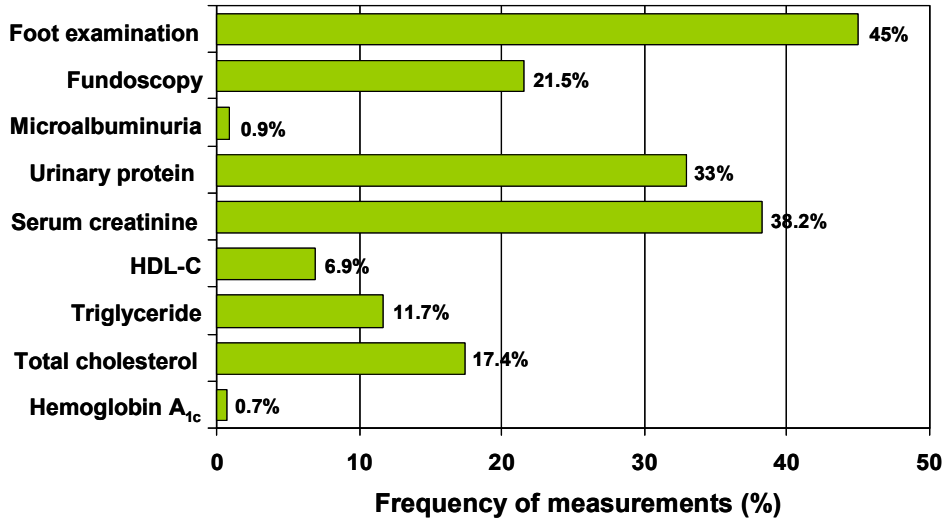

Fig. 1 The proportion of patients managed under primary care units who were provided with the recommended annual assessments for diabetes over the previous 12 months

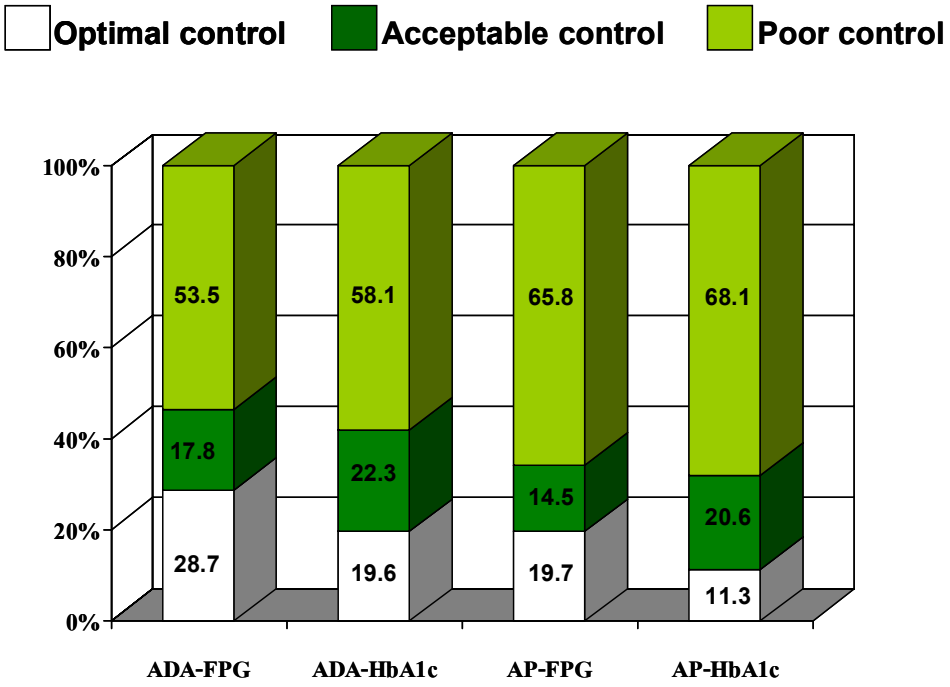

Fig. 2 The level of glycemic control among patients managed under primary care units, as assessed by two different criteria: the American Diabetes Association (ADA) 2001 criteria[6] and the Asia Pacific type 2 Diabetes Policy Group (AP) criteria[7]

In the ADA 2001 criteria, optimal control is defined as FPG < 6.7 mmol/l, HbA_{1c} < 7.0%, acceptable control: FPG 6.7-7.8 mmol/l, HbA_{1c} 7.0-8.0%, poor control: FPG > 7.8 mmol/l, HbA_{1c} > 8.0%

In the Asia Pacific type 2 Diabetes Policy Group (AP) criteria, optimal control is defined as: FPG ≤ 6.1 mmol/l, HbA_{1c} < 6.5%, acceptable control: FPG 6.11-7.0 mmol/l, HbA_{1c} 6.51-7.5%, poor control: FPG > 7.0 mmol/l, HbA_{1c} > 7.5%

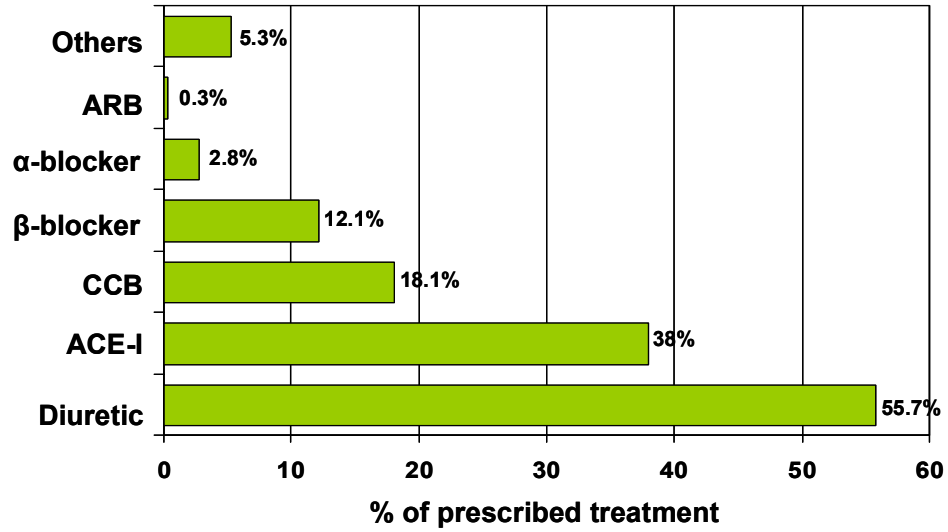

Fig. 3 The frequency of anti-hypertensive agent usage among patients managed under primary care units

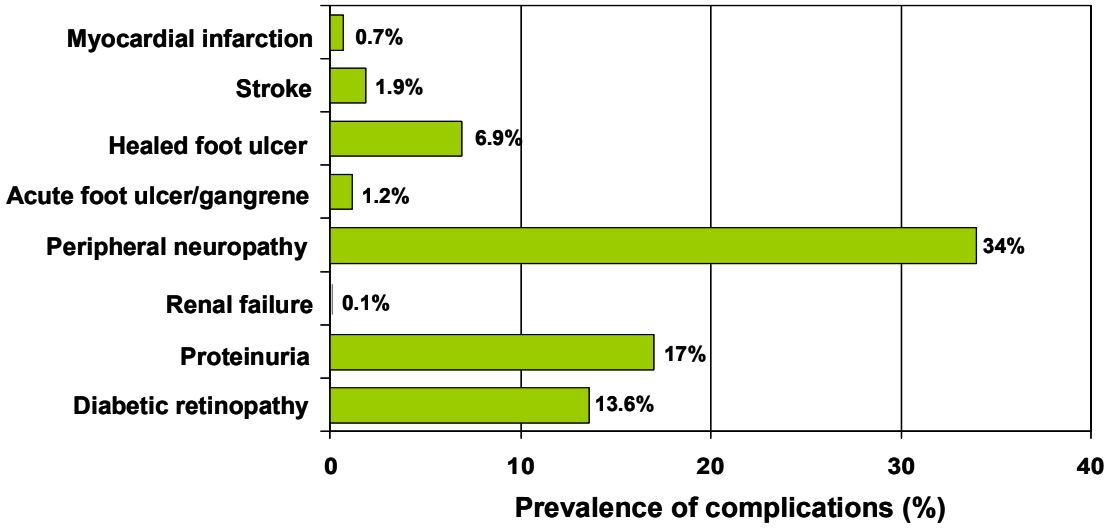

Fig 4. The prevalence of diabetic complications observed among patients under primary care units

cholesterol > 6.0 mmol/l and triglyceride > 2.2 mmol/l were found in 33.3% and 38.4% of the patients, respectively. Meanwhile, 27.0% of the patients had high-density lipoprotein cholesterol (HDL-C) < 1.0 mmol/l. Only 5.3% of the patients received lipid-lowering agents. Fibrate was prescribed in (86.8%), followed by statin (5.7%).

The majority of patients were taking oral hypoglycemic agent(s), while 6.7% needed insulin therapy. Treatment with traditional/herbal medicine was seen in 2.4% of the patients, whereas, 3.1% of the patients were on non-pharmacologic treatment. There were three types of oral hypoglycemic agents prescribed, including sulphonylurea (87.6%), metformin (53.2%), and alpha-glucosidase inhibitor (1.3%). Approximately, one half of the patients were on combination therapy.

The prevalence of late complications illustrated in Fig. 4 was retinopathy (13.6%), proteinuria

(17.0%), end stage renal failure (0.1%), peripheral neuropathy (34%), acute foot ulcer/gangrene (1.2%), healed foot ulcer (6.9%), stroke (1.9%) and myocardial infarction (0.7%). Cataract was frequently observed in 22.4% of the patients. A significant increase in serum creatinine of > 2.0 mg/dl was noted in 29 (7.2%) out of 405 patients assessed. Legal blindness (visual acuity < 20/200) was observed in 0.6% of the patients.

Discussion

The present study described the status of diabetes care and the outcomes among diabetic patients managed in primary health care facilities in Thailand during the year 2001. The proportion of patients with type 2 DM was similar to that previously reported[4,5]. The same demographic data as in previous reports were predominant of female patients, mean age, mean BMI, and percentage of overweight patients. However, the patients in the present report compared with the cohort of patients cared for in secondary/tertiary centers in 1998[5] had a later age of onset (52.2 $\pm$ 11.4 vs 49.6 $\pm$ 11.7 years), a shorter duration of diabetes (6.2 $\pm$ 4.0 vs 9.9 $\pm$ 6.7 years), and a higher rate of cigarette smoking (12.2 vs 5.0%). The comparison to the study in 1998 was chosen because it was the closest time, and the same definitions as well as standard measurement of HbA_{1c} were applied.

The monitoring of glycemic control was mainly based on measurement of FPG. The HbA_{1c} was barely assessed because the test was not available in primary health care units. The determination of serum lipids, a well-known cardiovascular risk, was infrequent. The annual assessment for diabetic complications was far less than those in secondary/tertiary care centers in Thailand[5]. The most frequent assessment was serum creatinine in 38.2% of the patients. The reasons for sub-optimal assessment were not explored by this survey. Realizing the healthcare providing system in Thailand, one reason could probably be the limited staff manpower and facilities in the primary care units. Other possible reasons included no recognition or unawareness of recommendations, negligence of physicians and ignorance of the patients. Unsurprisingly, the inadequate assessments were still observed in other parts of the world[9,11].

The outcome of glycemic control was not satisfactory. The mean $\pm$ SD of FPG and HbA_{1c} were 8.3 $\pm$ 2.7 mmol/l and 8.6 $\pm$ 1.9%, respectively. Only 19.6% of the patients had HbA_{1c} < 7.0%. A limited choice of anti-hyperglycemic agents in a primary care setting might be one cause of sub-optimal glycemic control. However, glycemic control of the patients in the present report was comparable to those treated elsewhere with somewhat similar facilities of care[9-13]. Unexpectedly, the outcome of glycemic control did not differ from those patients treated in the secondary/tertiary care centers in Thailand[5]. In patients with longer diabetes duration as those treated in secondary/tertiary care centers, a progressive loss of β-cell mass worsen glycemic control could result in more difficult to treat to target[14]. This might explain the similar outcome of sub-optimal glycemic control of the patients treated in the secondary/tertiary care centers[5].

Even though the glycemic control was similar to that achieved in the secondary/tertiary care centers[5], the complication rates differed quite remarkably. The prevalence of diabetic retinopathy was 13.6%, less than 24% observed in the patients treated in the secondary/tertiary care centers[5]. A shorter duration of diabetes in this group of patients might explain the difference. The prevalence of stroke (1.9%) and myocardial infarction (0.7%) were less than 3% previously observed[5] in the secondary/tertiary care centers as well. Although the smoking rate was higher, the lower rate of hypertension and dyslipidemia in this cohort could contribute to this finding. Hypertension and dyslipidemia were established vascular risk factors[15,16]. Peripheral neuropathy noted in 34% of the patients was higher than 27% seen in a previous report[5]. The reason was not clear but the finding itself could explain the higher rate of the acute foot ulcer/gangrene in 1.2% and healed foot ulcer in 6.9% of this cohort. Interestingly, the prevalence of proteinuria and elevated serum creatinine were similar compared to a previous report[5] (17% vs 17% for proteinuria and 7% vs 6% for elevated serum creatinine). Renal disease was common in the Thai population[17]. Albeit, other diseases causing renal impairment in type 2 diabetes were not uncommon[18,19]. The causes of proteinuria and elevated serum creatinine were not defined in the present study.

Conclusion

The present study demonstrated that the necessary, routine measures, such as an annual health check-up for patients with diabetes, were not regularly practiced by caregivers in primary care units. Peripheral neuropathy was the most common complication, and this might explain the observed high rate of foot ulcers. Sub-optimal glycemic control and cardiovascular risk management in the majority of patients could probably contribute to a higher complication rate in long-term follow-up.

Acknowledgements

The authors wish to thank the staff members and nurses in all participating hospitals for their contributions and collecting the data. The authors also wish to thank the Provincial Chief Medical Officers and Mr. Adisak Suwanpradhes for their generous support and coordination in all arrangements for the study. We also wish to thank Novo Nordisk and Bio-Rads for funding this project.

Appendix

List of participating hospitals.

Northern region (Chiangmai and Lampang Province): Fang Hospital, Chomthong Hospital, Sanpatong Hospital, Sansai Hospital, Mae-on Hospital, Koa-ka Hospital, Turn Hospital, Hangchat Hospital, Ngao Hospital, Jaehom Hospital.

Central region (Ratchburi and Petchburi Province): Vatpleng Hospital, Jed-samien Hospital, Bangpare Hospital, Jombung Hospital, Banlard Hospital, Banhlam Hospital, Kangkrachan Hospital, Kao-yoi Hospital.

Northeastern region (Nakhon Ratchasima and Chaiyaphum Province): Chokchai Hospital, Jagkarach Hospital, Pukthongchai Hospital, Dankhuntod Hospital, Non-sung Hospital, Kangkraw Hospital, Bamnetnarong Hospital, Nongbua-daeng Hospital, Banthan Hospital.

Southern region (Songkhla and Pathalung Province): Thepa Hospital, Bangklam Hospital, Ranod Hospital, Natavi Hospital, Sadao Hospital, Kuankanuan Hospital, Pakpayun Hospital, Papayom Hospital, Kaochaison Hospital, Ta-mod Hospital.

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การสำรวจการดูแลรักษาเบาหวานและการเกิดภาวะแทรกซ้อนของผู้ป่วยเบาหวานในหน่วยบริการปฐมภูมิ

วรรณี นิธิยานันท์, ธัญญา เชฏฐากุล, เพ็ญศิริวรรณ แสงอากาศ, ชัยพร ธีระเกียรติกำจร, เขมรัสมี ขุนศึกเม็งราย, จิง ปิง เยียว

การศึกษาภาคตัดขวางนี้มีจุดประสงค์ที่จะสำรวจการดูแลรักษาเบาหวาน และการเกิดภาวะแทรกซ้อนเรื้อรังในผู้ป่วยเบาหวานที่รับบริการในหน่วยบริการปฐมภูมิ ได้คัดเลือกหน่วยบริการปฐมภูมิ 37 แห่งในเขตเทศบาล หน่วยบริการแต่ละแห่งสุ่มเลือกผู้ป่วยที่มาติดตามรักษาเป็นเวลาไม่น้อยกว่า 1 ปีไม่เกิน 30 คน และสัมภาษณ์ร่วมกับทบทวนแฟ้มประวัติย้อนหลัง 1 ปี เพื่อเก็บข้อมูลการดูแลรักษา ผลการรักษา และภาวะแทรกซ้อนเรื้อรัง บันทึกข้อมูลที่ได้ในแบบบันทึกข้อมูลซึ่งถูกเปลี่ยนเป็นฐานข้อมูลโดยเครื่องสะแกน แล้ววิเคราะห์ด้วยโปรแกรม SAS รุ่น 6.12 ได้ผู้ป่วยจำนวน 1,078 คน เป็นชาย 300 คน และ หญิง 778 คน มีอายุเฉลี่ย (± ค่าเบี่ยงเบนมาตรฐาน) 58.2 (± 11.3) ปี อายุที่เกิดเบาหวานเฉลี่ย 52.2 (± 11.4) ปี ระยะเวลาที่เป็นเบาหวานเฉลี่ย 6.2 (± 4.0) ปี ผู้ป่วยส่วนใหญ่ (ร้อยละ 94) เป็นเบาหวานชนิดที่ 2 ผู้ป่วยเบาหวานชนิดที่ 1 พบร้อยละ 6 จำนวนสองในสามของผู้ป่วยได้รับคำอธิบายความรู้โรคเบาหวาน ≥ 5 ครั้งใน 1 ปีที่ผ่านมา การประเมินติดตามผลการควบคุมเบาหวานอาศัยการตรวจระดับน้ำตาลในเลือดที่เจาะเมื่อมารับบริการเป็นหลัก มีการตรวจที่จำเป็นต่อไปนี้ในอัตราต่างกันคือ การตรวจระดับฮีโมโกลบิน เอ 1 ซี ร้อยละ 0.7, ระดับโคเลสเตอรอลรวมร้อยละ 17.4, ระดับไตรกลีเซอไรด์ร้อยละ 11.7, ระดับเฮช ดีแอล โคเลสเตอรอลร้อยละ 6.9, ระดับซีรัมครีอะตินีนร้อยละ 38.2, มีการตรวจโปรตีนใน ปัสสาวะร้อยละ 33.0, และการตรวจปริมาณไข่ขาวในปัสสาวะร้อยละ 0.9 ผู้ป่วยกลุ่มนี้มีค่าเฉลี่ยของระดับน้ำตาลในเลือดขณะอดอาหารเท่ากับ 8.3 (± 2.7) มิลลิโมล/ลิตร และค่าเฉลี่ยของระดับฮีโมโกลบิน เอ 1 ซี เท่ากับ 8.6 (± 1.9) เปอร์เซ็นต์ ผู้ป่วยที่ระดับน้ำตาลในเลือดขณะอดอาหาร < 6.7 มิลลิโมล/ลิตร พบได้ร้อยละ 28.7 และ ระดับฮีโมโกลบิน เอ 1 ซี < 7.0 เปอร์เซ็นต์พบได้ร้อยละ 19.6 ผู้ป่วยร้อยละ 21.5 ได้รับการตรวจตาประจำปี และร้อยละ 45 ได้รับการตรวจประเมินสภาพเท้า ภาวะแทรกซ้อนเรื้อรังที่ตรวจพบคือ จอประสาทตาเสื่อมจากเบาหวานร้อยละ 13.6, มีโปรตีนในปัสสาวะร้อยละ 17.0, ไตวายร้อยละ 0.1 ประสาทส่วนปลายเสื่อมร้อยละ 34.0, มีแผลเฉียบพลันที่เท้าและเท้าเน่าดำร้อยละ 1.2, มีแผลหายแล้วที่เท้าร้อยละ 6.9, อัมพฤกษ์ร้อยละ 1.9, และโรคกล้ามเนื้อหัวใจตายร้อยละ 0.7 ผลการสำรวจบ่งชี้ว่าการประเมินติดตามผลการรักษาเบาหวานในหน่วยบริการปฐมภูมิยังทำได้ไม่ครบถ้วน การพบประสาทส่วนปลายเสื่อมในอัตราสูงอาจอธิบายความชุกของการเกิดแผลที่เท้าในผู้ป่วยกลุ่มนี้ได้