CLINICAL OUTCOMES AMONG TYPE 2 DIABETES MELLITUS PATIENTS: BEFORE AND AFTER UNIVERSAL HEALTH COVERAGE IN INDONESIA

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ABSTRACT

Objective: This study was conducted to analyze the impact of universal health coverage in Indonesia, known as Jaminan Kesehatan Nasional (JKN) on percentage of patients who did fasting blood glucose (FBG) tests each hospital visit and clinical outcomes (CO) among type 2 diabetes mellitus (T2DM) patients.

Methods: We conducted a longitudinal retrospective study to collect the data from 6-month before JKN and 1-year after JKN at three hospitals in Jakarta Province. All T2DM outpatient's services using Asuransi Kesehatan (ASKES) with at least 6 hospital visits were included in the study. The subject with double insurances and died before implementation of JKN were excluded from the study. The CO before and after JKN were compared with Wilcoxon test.

Results: Total samples that collected were 296 patients divided to predominance female with 166 (56%) and male 125 (44%). From the data, it seemed that there were no all patients who did FBG test. We founded 50% of patients had FBG test before JKN. Meanwhile, the percentage at the beginning of JKN tended to be lower about 37% than before JKN. Number of patients decreased associate with JKN but number of hospital visit increased. Based on FBG level, 17 (9.19%) patients had better CO and this number increased slightly after JKN to 22 (11.89%). In contrast, patients with worse FBG level decreased about 9%. More patients had bad stable and less patients good stable FBG level. Statistical analysis showed that CO between before and after JKN had p=0.404 among T2DM outpatients in Type A hospitals and p=0.877 in Type B hospital.

Conclusion: Implementation of JKN had an impact to decrease percentage of patients who did FBG tests and number of patients but raised hospital visit. CO was different significantly between before and after JKN among T2DM outpatients in Type A hospitals but was no different in Type B hospital.

Keywords: Universal health coverage, Clinical outcome, Type 2 diabetes mellitus, Fasting blood glucose.

INTRODUCTION

Currently, Indonesian government has implemented universal health coverage (UHC), well known as Jaminan Kesehatan Nasional (JKN) since 1st January 2014. JKN defined as non-profit and comprehensive health public insurance for all Indonesian citizen [1,2]. Before implementation of JKN, there were a lot of public health insurances. One of them was Asuransi Kesehatan (ASKES). ASKES was health public insurance for civil servant and pensioner.

There are different payment method between ASKES and JKN. ASKES uses "fee for services" method and JKN uses Indonesia Case Base Groups (INA-CBGs) method [2]. In INA-CBGs method, cost treatment is limited based on diagnose and type of hospital, for example Rp. 362 thousand (USD 27.618) and Rp. 165 thousand (USD 12.622) for patients among Type A hospitals and Type B hospital, respectively [3]. Consequently, hospital will limit services regard to treatment cost from INA-CBGs and will impact to patient's clinical outcomes (CO).

Nowadays, Indonesia was one of the top 10 countries in number of people living with diabetes in the world [4]. National health survey revealed that the prevalence diabetes in 2013 increased 2 times from prevalence in 2007 [5]. As a result, number of type 2 diabetes mellitus (T2DM) outpatients will increase in the future and need comprehensive services to ensure their CO.

Based on preliminary study in one of Type A hospitals, we founded difference of total number of medicine and number of non-generic medicine used among T2DM outpatients after implementation of JKN [6]. However, we have no data about the influence of these differences to CO. Therefore, this study was conducted to understand CO among T2DM outpatients between before and after JKN.

METHODS

Study design and data collection

The retrospective longitudinal study was conducted to recruit the data from 6 months before JKN and 1 year after JKN (from July 2013 to December 2014) among T2DM outpatients in 3 Hospital's Jakarta Province, Indonesia. We collected the data, such as socio-demographic, profile treatment, hospital visit, and laboratory data, for example fasting blood glucose (FBG) in 2 hospitals of Type A and 1 hospital of Type B.

Study subject

This study was approved by ethical committee from three hospitals. Subjects in this study were all adult T2DM outpatients who used ASKES, public insurance before JKN, and visited hospital routinely at least 6 times during the period of this study. Subject with double insurances and died before implementation of JKN were excluded in this study.

Outcome measurement

Parameter to analyze the CO was FBG. The normal of FBG was <126 mg/dL. CO in this study was divided into four categories. The first category was better CO that defined as patients showed the improving of FBG test to normal. Good stable CO was defined as FBG score always normal in every test. Bad stable CO was defined as FBG score always higher than normal. Worse CO was defined as FBG score from normal to higher score than 126 mg/dL.

Data analysis

Patients characteristic, number of patients, hospital visit, FBG test, and CO were calculated and analyzed using one of statistical software. The results were presented as number, mean, and percentage (%). We used Wilcoxon test to compare CO before and after JKN.

RESULTS

Sociodemographic characteristic

A total of 291 (100%) patients were enrolled from polyclinic of T2DM outpatients who met inclusion criteria at 3 Jakarta's Hospitals, Indonesia. There were 179 patients eligible in type A Hospitals, 43% T2DM outpatients were male and 57% were female. We recruited 112 patients in Type B hospital. Among of them were 44% male and 56% female. Totally, more than female's T2DM outpatients than male in 3 hospitals. We also founded that patients in this study had mean of age 65.91±8.336 (Table 1).

Trend number of patients and hospital visit before and after JKN

According to this study, trend number of patients and hospital visit were expressed on Fig. 1. In the first semester of implementation of UHC in

Indonesia, number of patients dropped in Type A hospitals, but we founded number of patients in Type B hospital was similar between before and after JKN. However, number of hospital visit among T2DM outpatients increased in the first semester of JKN but similar hospital visit with before JKN in the second semester. If the whole data were analyzed, number of patients in 3 Jakarta's Hospitals showed decreasing after applied JKN and the result also performed that number of hospital visit increased in era of JKN.

The impact of JKN on percentage patients who did FBG test in hospital visit

As shown in Fig. 2, percentage patients who did FBG test per hospital visit per month in three Jakarta's Hospitals was performed. The graph demonstrated not all patients who visited hospital did FBG test during the period of study. Only 50% patients had FBG test before implementation of JKN in all Hospitals. In the first semester implementation of JKN, this number decreased to 37% patients who did FBG test per hospital visit. In contrast, percentage patients who did FBG test increased to 64% in September 2014. The decreasing of percentage more dramatic in Type B hospital than Type A hospitals.

The impact of UHC in Indonesia on COs among T2DM outpatients

The further results expressed CO associated with FBG. CO is one of the essential parameter to measure the impact new insurance, JKN, in Indonesia among T2DM outpatients. However, there were no patients did FBG test every month, the number patients had met the inclusion criteria to analyze the CO were 185 patients from 291 patients. Distribution of CO among study population was presented in Fig. 3.

From the data, we founded the percentage of patients with better CO increased from 17 (9.19%) patients to 22 (11.89%). In contrast, the

Table 1: Mean age distribution among gender

Gender	N (%)			Mean of age
	Type A hospitals	Type B hospitals	All hospitals	
Male	76 (43)	49 (44)	125 (43)	67.41±8.373
Female	103 (57)	63 (56)	166 (57)	64.79±8.153
Total	179 (100)	112 (100)	291 (100)	65.91±8.336

Data are expressed as number (percentage); mean±SD. SD: Standard deviation
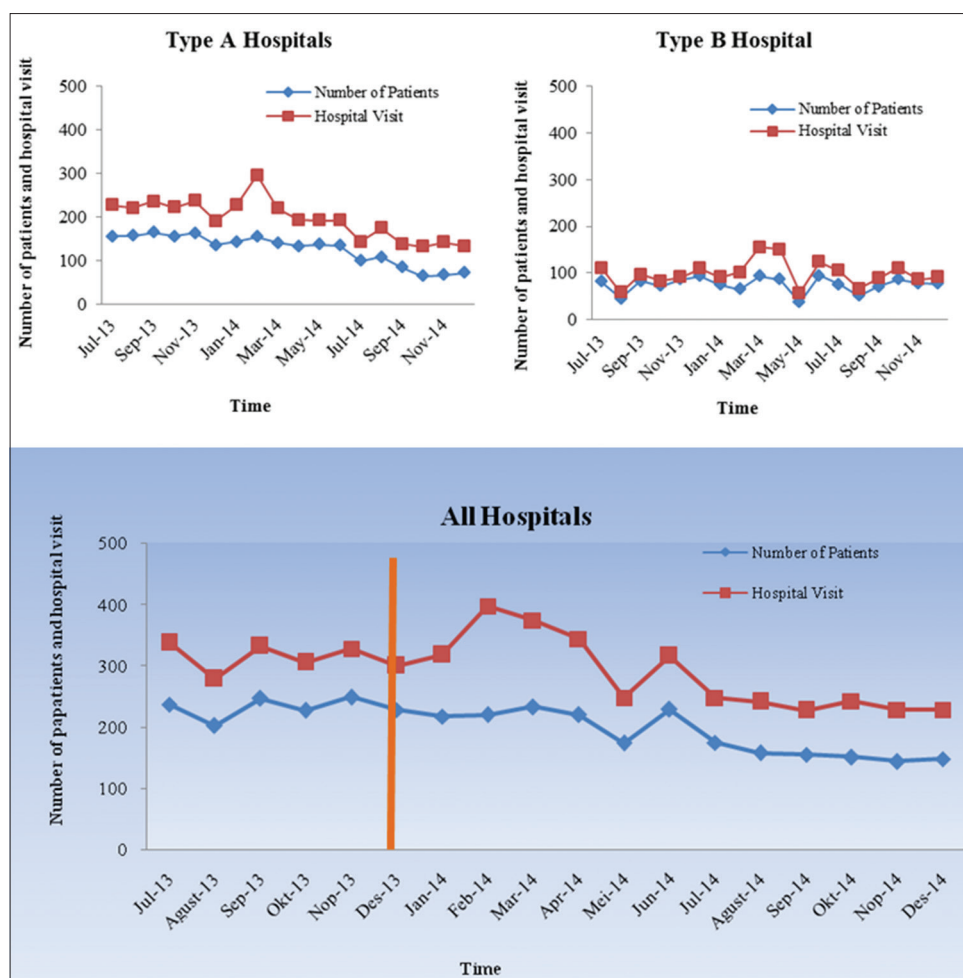

Fig. 1: Number of patients and hospital visit between before and after Jaminan Kesehatan Nasional from July 2013 to December 2014
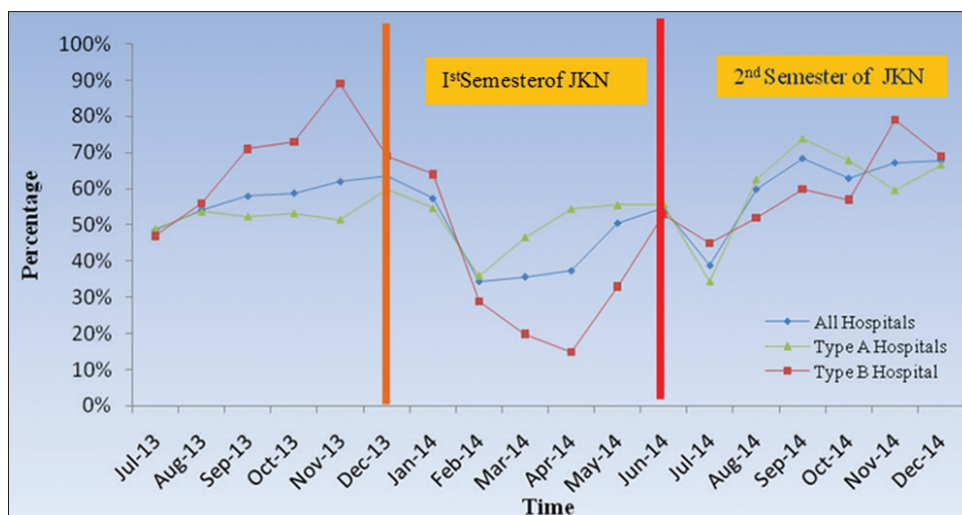
Fig. 2: Percentage of fasting blood glucose per hospital visite from July 2013 to December 2014. Data expressed as percentage from total of hospital visit per month
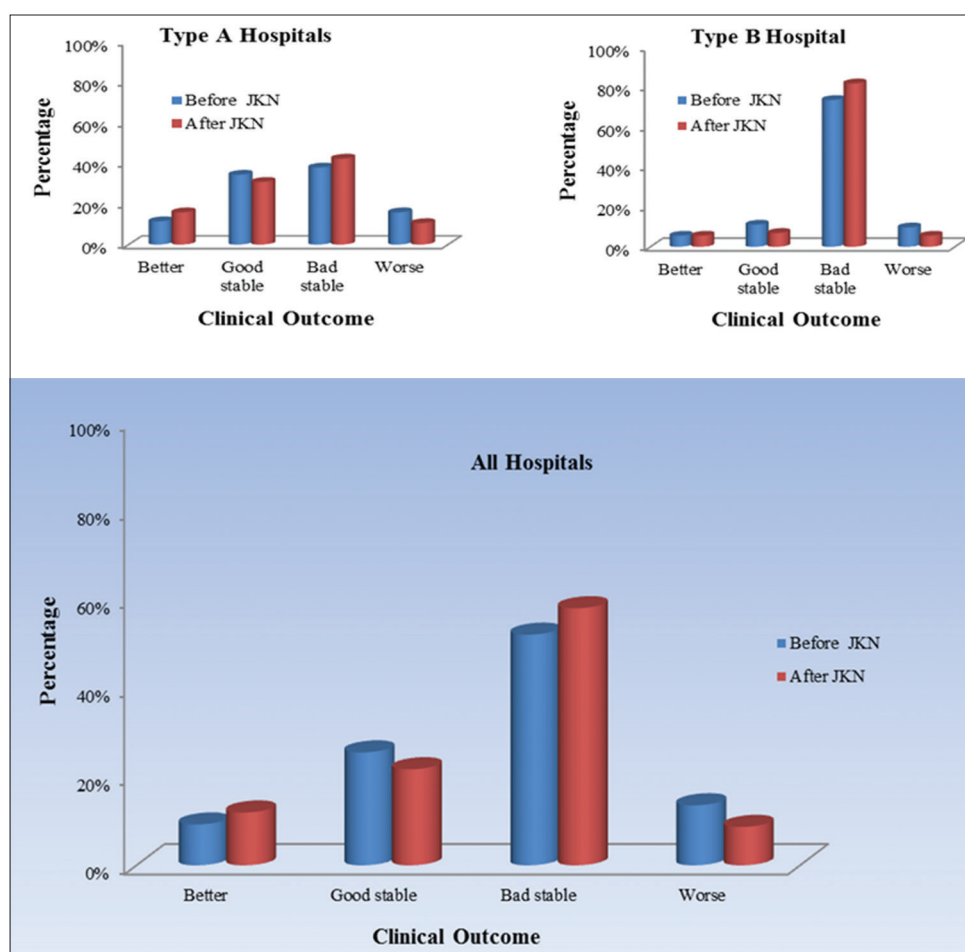

Fig. 3: Distribution of clinical outcomes among type 2 diabetes mellitus outpatients before and after Jaminan Kesehatan Nasional. Data expressed as percentage from total of patients

percentage of patients with better worse CO decreased from 13.51% to 9% after implementation of JKN. This result clearly clarified that CO improved after JKN. In the other hand, the result was reported that patients with good stable CO in era of JKN lower than before JKN and number of patients with bad stable tended to increase after JKN. We assumed that CO was not improved associated with these categories.

To compare CO between before and after JKN, We also analyzed the CO using Wilcoxon test because the data distributed non-normal. Statistical analysis among T2DM outpatients in Type A hospitals demonstrated p=0.404. In the other hand, p value was 0.877 for T2DM outpatients in Type B hospital. Meanwhile, p value for differences of CO before and after JKN at three hospitals was 0.524.

DISCUSSION

In this study, there was predominance of female then followed by male. A study by Wilson *et al.* in Ontario also had similar report [7]. This result was linier with RISKESDAS by Ministry of Health (MoH) [8] and result study in Mexico [9]. Most of the T2DM patients in this study were geriatric because one risk factor to get T2DM was age more than 45 years old [10].

In era of JKN, health services and facilities were divided to primary health-care facility and higher level facility. The primary health-care facility was community health center, known as Puskesmas, a private clinic, or a TNI-Polri clinic which has collaboration with the Social Security Administration Agency, known as BPJS. BPJS is agency that responsibility of JKN program. The next health service is higher level facility such as hospital. Patients can be accessed this facility only based on referral from the primary health-care facility, except for emergency. If this procedure is not followed, JKN will not cover the treatment cost [11].

This study founded number of patient decreased after implementation of JKN as shown in Fig. 1. It was caused by refer back program. Based on Minister Decree no 28 years 2014, diabetes mellitus is one of the chronic disease [12]. T2DM outpatients who have not complication and blood glucose were stable should go to primary health care, known as refer back program. T2DM patients will get recommendation letter from doctor in higher level health service and facilities to register refer back program in BPJS. Patients with refer back program will visit the doctor and get medicine in primary health care. Every 3 month, patients will be allowed to higher level facilities and see a doctor. If the diagnose is good, the patients will transfer to primary health care as member of refer back program [11]. The implementation of refer back program is still need socialization. A study in Ternate reported that official understanding of the policy reference was still relative poorly [13]. Another problem in this program was inappropriate refer back program because limited facilities, drug availability, and human resources [14].

Furthermore, we analyzed the impact of JKN to number of hospital visit. However, number of patients dropped after launched JKN, number of hospital visit raised in the first semester of JKN (Fig.1). One of the reasons related to this condition was the different payment method in era of JKN. JKN used INA-CBGs method that only cover cost of medicine for 7 days. T2DM patients need medicine for 30 days a month to maintain blood glucose concentration. In contrast, T2DM patients get medicine for 30 days that was covered by ASKES. Consequently, many T2DM patients disappointed for this program and patients have to visit more frequent. Other study revealed that patient's satisfaction was lower in era of JKN than ASKES [15]. Nugraheni *et al.* (2015) also reported that JKN's patient was unsatisfied through services [16]. Government tried to solve this problem that chronic disease, mainly diabetes mellitus will get the medicines for 30 days [11]. Medicines of 7 days will be covered by INA-CBGs method, and medicine of 23 days will be covered by fee for service method. As a result, patients had to visit hospital more than one time to get the medicine.

On the other hand, in the beginning of this announcement, not all patients understood with this issue. As a result, BPJS also have declared the decree no 38 year 2014 to support the previous decree from MoH [17]. This decree had positive impact to increase hospital visit and became similar with hospital visit before JKN.

The next our result demonstrated FBG test per hospital visit decreased in the first semester and start to increase in the second semester of JKN (Fig. 2). There were many problems in the beginning of implementation of JKN especially in the first semester of JKN. The limitation of cost treatment based on diagnoses (INA-CBGs method) also contributed this problem. This decreasing was more significant in Type B hospital than Type A hospitals. It was caused cost treatment that was covered based on INA-CBGS method in Type A hospitals was bigger than Type B hospital, Rp. 362 thousand (USD 27.618) and Rp. 165 thousand (USD 12.622), respectively [4]. Another study reported real treatment cost T2DM outpatients higher the INA-CBG's standard [18]. It will associate with the limitation services to patients.

CO is one of the essential parameter to audit the new insurance, JKN. Hemoglobin A1C (HbA1C) and FBG test are parameters to measure CO among T2DM patients [19-21]. We collected HbA1C and FBG test in this study. The data of HbA1C were very limited. Haghighatpanah *et al.* (2016) founded moderate correlation and the sensitivity, specificity among FBG and HbA1C [22]. Because of that, we considered to use FBG test to analyze the CO among T2DM outpatients. Other studies were reported using FBG test to analyze improved outcome with T2DM outpatients [23-26]. This study was linier with Jones *et al.* (2004) used FBG to observe the effect of insulin among diabetes mellitus patients [27].

We divided COs into four categories that were better, good stable, bad stable, and worse CO. The data were non-normal distributed. As a result, we used Wilcoxon test related to find the differences CO between before and after JKN. There was no significant different (p>0.05) CO among T2DM outpatients after implementation of JKN in Type B hospital. Nevertheless, statistical analysis expressed that p<0.05 among T2DM outpatients in Type A hospitals. It defined as CO was not similar before and after JKN. T2DM outpatients in Type A hospital performed improved CO. On the other hand, the result of Wilcoxon test from combination of CO from all hospitals showed p>0.05. Improved CO among T2DM outpatient in Type A hospitals related to higher cost treatment that was covered by JKN. Consequently, T2DM outpatients will get more services than patients in Type B hospitals and also impact to CO. Another study at one hospital in Bali, Indonesia founded that patients with JKN showed a greater reduction of blood glucose concentration and lower side effect than non-JKN's patients [28].

CONCLUSION

JKN as a new public health insurance in Indonesia had impact to increase hospital visit and decreased number of patients. The percentage of FBG test per hospital visit dropped in the first semester implementation of JKN and this percentage raised in the second semester of JKN. CO was different significantly among T2DM outpatients in Type A hospital but was no different in Type B hospital.

ACKNOWLEDGMENT

REFERENCES

1. Regulation of President of The Republic Indonesia No. 12 Year 2013. Health Care Benefit. Jakarta; 2013.
2. Ministry of Health the Republic of Indonesia Decree No. 27 Year 2014. Technical Instruction of INA-CBGs. Jakarta; 2014.
3. Ministry of Health the Republic of Indonesia Decree No. 59 Year 2014. Tariff Standard of Health Services in Implementation of National Health Insurance. Jakarta; 2014.
4. International Diabetes Federation. IDF Diabetes Atlas. 5th ed. Belgium: International Diabetes Federation; 2012.
5. National Health Survey (RISKESDAS). Central Data and Information Ministry of Health The Republic of Indonesia. Jakarta; 2014.
6. Restinia M, Anggriani Y, Kusumaeni T, Meryta A. Drug treatment profile among outpatients of Type 2 diabetes mellitus after implemented of JKN. J Ilmu Kefarmasian Indones 2015;13:63-8.
7. Wilson SE, Rosella LC, Lipscombe LL, Manuel DG. The effectiveness and efficiency of diabetes screening in Ontario, Canada: A population-based cohort study. BMC Public Health 2010;10:506.
8. National Health Survey (RISKESDAS). Central Data and Information Ministry of Health The Republic of Indonesia. Jakarta; 2013.
9. Pagán JA, Puig A. Differences in access to health care services between insured and uninsured adults with diabetes in Mexico. Diabetes Care 2005;28(2):425-6.

10. Association Diabetic American. Diagnosis and classification of diabetes mellitus. Diabetes Care 2014;37(1):S14-27.
11. Ministry of Health the Republic of Indonesia Decree No. 32/1/2014. Health Service on BPJS's Members in Primary and Advanced Health Care Facilities. Jakarta; 2014.
12. Regulation of Ministry of Health the Republic of Indonesia No. 28 Year 2014. Guideline Implementation of JKN. Jakarta; 2014.
13. Ali FA, Kandou GD, Umboh JML. Analysis of the implementation of the first level outpatient referral program participant of the national health insurance (JKN) di Siko PHC and PHC Kalumata Ternate 2014. JIKMU 2015;5(2):221-37.
14. Purwarti EII. Decision making by puskesmas in implementation of refer back program as primary health care and facilities. Jember: University of Jember; 2016.
15. Trisnawati K, Sumarni S, Fudholi A. Analysis of outpatient satisfaction for civil servant during the implementation of ASKES and JKN. J Manage Pharm Pract 2015;5(1):33-9.
16. Nugraheni G, Putri LR, Setiawan CD, Wijaya IN. BPJS Patient's Satisfaction to Quality of Pharmacy Services in Health Center (Analysis Using SERVQUAL Model and Customer Window Quadrant. Proceeding IAI 2016;e-ISSN:2541-0474.
17. BPJS Decree No. 38 Year 2014. Technical Instruction for Implementation of Ministry of Health the Republic of Indonesia Decree No. 32/1/2014.
18. Fitri E, Andayani TM, Suparniati E. Cost analysis of diabetes mellitus. J Manag Pharm Pract 2015;5(1):61-6.
19. Colagiuri S, Cull CA, Holman RR; UKPDS Group. Are lower fasting plasma glucose levels at diagnosis of Type 2 diabetes associated with improved outcomes? U.K. prospective diabetes study 61. Diabetes Care 2002;25(8):1410-7.
20. Arcavi L, Behar S, Caspi A, Reshef N, Boyko V, Knobler H. High fasting glucose levels as a predictor of worse clinical outcome in patients with coronary artery disease: Results from the bezafibrate infarction prevention (BIP) study. Am Heart J 2004;147(2):239-45.
21. Sherr JL, Boyle CT, Miller KM, Beck RW, Tamborlane WV; TD exchange clinic network. No summer vacation from diabetes: Glycemic control in pediatric participants in the TID exchange registry based on time of year. Diabetes Care 2016;39(12):e214-5.
22. Haghighatpanah M, Thunga G, Khare S, Mallayasamy S. Correlation of glycosylated hemoglobin levels with fasting and postprandial glucose in South Indian Type 2 diabetic patients. Int J Pharm Pharm Sci 2016;8(8):285-8.
23. Harris MI, Eastman RC, Cowie CC, Flegal KM, Eberhardt MS. Racial and ethnic differences in glycemic control of adults with Type 2 diabetes. Diabetes Care 1999;22(3):403-8.
24. Barzilay JI, Davis BR, Cutler JA, Pressel SL, Whelton PK, Basile J, *et al.* Fasting glucose levels and incident diabetes mellitus in older nondiabetic adults randomized to receive 3 different classes of antihypertensive treatment: A report from the antihypertensive and lipid-lowering treatment to prevent heart attack trial (ALLHAT). Arch Intern Med 2006;166(6):2191-201.
25. Raz I, Wilson PW, Strojek K, Kowalska I, Bozikov V, Gitt AK, *et al.* Effects of prandial versus fasting glycemia on cardiovascular outcomes in Type 2 diabetes: The HEART2D trial. Diabetes Care 2009;32(3):381-6.
26. Somepalli M, Vinukonda K, Panugandla R, Shankar SB, Lakshmi CC. Prevalence of acute cardiac and renal complications in poorly controlled diabetics and role of clinical pharmacist in modifying disease outcome in a tertiary care hospitasl. Int J Pharm Pharm Sci 2015;7(2):92-6.
27. Russell-Jones D, Simpson R, Hylleberg B, Draeger E, Bolinder J. Effects of QD insulin detemir or neutral protamine Hagedorn on blood glucose control in patients with Type 1 diabetes mellitus using a basal-bolus regimen. Clin Ther 2004;26(5):724-36.
28. Rudiarta NM. Comparison of treatment effectiveness between JKN and non JKN among Type 2 diabetes mellitus outpatients in Udayana hospital. Bali: University of Udayana; 2016.