Quest Journals
Journal of Medical and Dental Science Research
Volume 9~ Issue 5 (2022) pp: 68-74
ISSN(Online) : 2394-076X ISSN (Print):2394-0751
www.questjournals.org

Research Paper

Socio-Demographic Characteristics as Correlates of Knowledge and Control Practices of Hypertension among People Living With Diabetes in a Tertiary Health Facility in Osogbo, Nigeria

FOLAMI, Roseline Olufunmilola
Department of Nursing
Osun State University, Osogbo

FOLAMI, Emmanuel Oladayo
Department of Anaesthesia
Osun State University, Osogbo

LAMIDI, Ayodeji Ogunremi
Department of Medicine
Osun State University, Osogbo

Abstract
The study examined socio-demographic characteristics as correlates of knowledge and control practices of hypertension among hypertensive diabetic patients in a tertiary health facility in Osogbo, Nigeria. This study adopted a quantitative descriptive survey design. The target population comprises of hypertensive diabetic patients attending the endocrine clinic of Osun State University Teaching Hospital Osogbo. Total enumeration was adopted for the study. Questionnaires were administered to the 102 people living with diabetes and hypertension who visited the endocrine clinic within the 3 weeks. 3 patients returned their questionnaires uncompleted. A self-designed questionnaire was used to collect data for this study. The reliability of the instrument was established through an internal consistency approach. A Cronbach's Alpha coefficient of 0.753 was calculated. The data collected were analyzed and results presented under each specific objective. The research objectives were analysed using Chi-square Analysis. The result revealed that 51(50%) Respondents were within the ages of 61yrs and above, majority 74 (72.5%) were females, 40 (39.2%) had tertiary education, 64(62.7%) had been diabetic for more than 10 years, 50(49%) were traders, while 63(61.8%) earn between10,000-30,000 Naira monthly. Age (x^2=19.83,df=10,p=.031) and occupation(x^2=9.85, df=6, p=.041) were good correlates of knowledge of hypertension while age (x^2=37.13,df=10, p=.000), level of education(x^2=18.09, df=8,p=.011) and occupation(x^2=10.33,df=6, p= .023) were good correlates of control practices of hypertension among the people living with diabetes and hypertension. The study concluded that knowledge level of hypertension is related to hypertensive control practices of the people living with diabetes and hypertension. The study also concluded that age and occupation are good correlates of knowledge of hypertension among hypertensive diabetics while age, level of education and occupation are good correlates of control practices of hypertension among hypertensive diabetics. It was recommended among others that commencement/modification of nursing health education sections and role play that can help improve the diabetic's knowledge of hypertension control at every clinic days.

Keywords: *Socio-demographic Characteristics, Knowledge, Control Practices, Hypertensive Diabetics,*

***R**eceived 15 May, 2022; **R**evised 28 May, 2022; **A**ccepted 30 May, 2022 © The author(s) 2022.*
P**ublished with open access at **www.questjournals.org

I. Introduction

Hypertension has become a global problem that negatively influences the quality of life of people affected. It coexistence with diabetes put a greater strain and burden on patients and the healthcare system at

large. Drug compliance and hypertension control practices has being confirmed to control blood pressure, improves the general wellbeing of the hypertensive diabetics and prevent several cardiovascular complication that increases disease burden, disabilities and mortality rate due to hypertension among the diabetics. Failure to implement these practices heightens blood pressure and hastens cardiovascular complications in many folds among the diabetics than the non-diabetics sending majority of the hypertensive diabetics to early grave. But, the knowledge of hypertension and its control practices is expected to stimulate the diabetics to drug compliance and timely self-care practices that assist in early control of blood pressure.

Hypertension occurs when the force is 140/90mmhg and above (World Health Organization, 2019). Although researchers such as Passarella, et al (2018) recommended a target blood pressure goal of 140/90mmhg and below for majority of the diabetics, yet there is a 54% increase in prevalence of hypertension with blood pressure of > 160/95mmhg among the diabetics (Jacob & Siddiq, 2018). WHO in 2019 documented that hypertension affects 1.13 billion people globally. WHO, (2016) stated that 46% of African adults are hypertensive which is the highest rate in the world. A study conducted in Africa recorded that 85.6% of hypertension occurs among the diabetics with its prevalence among the diabetics two times more than it occurs among the general populace (Nouh, Omar & Younis, 2017).If this current trajectory continues, it is estimated that there will be a 60% increase in the number of hypertensive adults to a total of 1.56 billion by the year 2025, killing up to 80% of the diabetics (Tadesse, et al, 2018). In Nigeria, Onuoha and Egwin (2017) recorded 44% prevalence of hypertension among the diabetics at age 57, the value rose to 85.5% at age 80 , with lesser percentage of 1% to 24.4% prevalence among the non-diabetic as compared with 18-85.5% prevalence of hypertension among the diabetics.

Despite this reality, it is unfortunate that the African diabetics are finding it difficult to achieve controlled blood pressure of 130/80mmhg. In Nigeria, a study conducted by Aniedi, Ekong and Idung (2018) in Uyo, showed that 80% of Nigerian diabetics had uncontrolled blood pressure. Controlled blood pressure among the hypertensive diabetics has being linked to a greater reduction in the micro and macro vascular diseases, morbidity and mortality rate of the diabetics (Kintscher, 2015).

Despite the documented importance of controlled blood pressure in the prevention of cardiovascular diseases, retinopathy, neuropathy and in the reduction of hypertension attributed higher mortality rate among the hypertensive diabetics, the knowledge and implementation of those practices implicated in the control of hypertension still remains questionable. This is because as much as, previous researchers such Sintayehu, et al (2017) documented that practices such as drug compliance, dietary control, weight control, daily moderate exercise, limited alcohol intake, limited salt intake, smoking cessation, use of dietary supplements such as daily vitamin C and the consumption of potassium rich fruits and foods help to keep blood pressure controlled.

Poor knowledge of hypertension and its control practices exposes the hypertensive patients to higher blood pressure values which exposes them to various cardiovascular diseases and death that becomes even greater when hypertension coexist with diabetes (Aniedi, Ekong & Idung 2018). But, Knowledge of hypertension stimulates the application of its control practices and the achievement of combined target goals of blood pressure and blood sugar among the hypertensive diabetics (Yang, et al, 2017).

Buang, Rahman, and Haque (2019) stated that 2.4% of participants were not sure of any practicing methods. Approximately 76.0% stated that reducing body weight is used in managing hypertension while 81.1% accepted that salt reduction as another method. Only 45.0% of participants knew that increased consumption of fruits and vegetables would improve control of hypertension. Overall knowledge score was Inadequate (<50%) among 92% (n=391) with mean of 30.8% (SD ± 15.5). Statistical significant relationship was observed knowledge score and marital status, family history of chronic disease, educational level and monthly income ($p< 0.000$).

Aghoja, Okinedo and Odili (2017) in their study of knowledge, attitude, and practices of hypertensive patients towards hypertension in a secondary health care facility in Delta state found that the mean knowledge scores of respondents was good (56.5%) with only 15.2% of the respondents knowing that hypertension has no presenting sign and symptoms, but 84.9% knew what normal blood pressure should be. The mean positive practice response was 56.5%. However, only 41.8% respondents check their blood pressure regularly but only 9.5% of them eat an appropriate healthy diet. Age, occupation, marital status and duration of hypertension significantly affected respondent's knowledge of hypertension.

The study therefore examined socio-demographic characteristics as correlates of knowledge and control practices of hypertension among hypertensive diabetic patients in a tertiary health facility in Osogbo, Nigeria. The study specifically:

1. assessed the relationship between the knowledge level of hypertension and the level of hypertension control practices among people living with hypertension and diabetes;
2. examined the socio-demographic correlates of knowledge among people living with hypertension and diabetes;
3. determined the socio-demographic correlates of hypertension control practices among people living with hypertension and diabetes.

II. Methodology

This study adopted a quantitative descriptive survey design. The target population comprises of people living with hypertension and diabetes attending the endocrine clinic of Osun State University Teaching Hospital Osogbo. The average population of diabetic patients attending endocrine clinic per week according to the clinic record is 38 out of which 35 patients were hypertensive diabetics. Endocrine clinics are run on Thursdays of every week. The total numbers of diabetic patients that attends the clinic monthly is 152. Total enumeration was adopted for the study. Questionnaires were administered to the 102 hypertensive diabetic patients who visited the endocrine clinic within the 3 weeks. 3 patients returned their questionnaires uncompleted.

A self-designed questionnaire was used to collect data for this study. The questionnaire was divided into sections based on the objectives of the study. The questionnaire was translated to Yoruba language for the benefit of those who do not understand English language so they can understand the concepts and questions in the study. The face and content validity of the instrument was ascertained by presenting the instrument to experts who have wealth of knowledge in the field. Corrections were done before administration of the instruments. The reliability of the instrument was established through an internal consistency approach. Twenty copies of the instrument were administered to hypertensive diabetic patients attending the endocrine clinic of Obafemi Awolowo University Teaching Hospital Complex Ile-Ife (OAUTHC) and subjected to reliability test. A Cronbach's Alpha coefficient of 0.753 was calculated.

The instrument was read to participant who cannot read, or are too weak to fill the questionnaire but wishes to be participants. It was also translated to Yoruba for those that cannot read English, and they were assisted in filling it with the respondent's chosen appropriate answers. The data collected were analyzed and results presented under each specific objective. Data were analyzed with the use of Statistical Package for Social Science (SPSS) version 25. The research objectives were analysed using Chi-square Analysis

III. Results

Table 1: Socio Demographic Characteristics of the Respondents

Variable	Frequency	Percentage
Age Group		
18-20yrs	4	3.9
21-30yrs	5	4.9
31-40yrs	11	10.8
41-50yrs	12	11.8
51-60yrs	19	18.6
61yrs and above	51	50.0
Sex		
Male	28	27.5
Female	74	72.5
Educational status		
No Formal Education	16	15.7
Primary Education	36	35.3
Secondary Education	10	9.8
Tertiary Education	40	39.2
Duration of Being Diabetic		
0-5years	14	13.7
6-10years	24	23.5
More than10years	64	62.7
Occupation		
Civil Servant	28	27.5
Artisan	3	2.9
Traders	50	49.0
Unemployed	21	20.6

Monthly Income		
<10,000	19	18.6
10,000-30000	63	61.8
>30,0000	20	19.6

Table 1 showed that 3.9% of the respondents were within the ages of 18-20years, 10.8% were within the ages of 31-40years, 11.8% were within the age range of 41-50yrs while 50% of the respondents were 61yrs and above. 15.7% of the respondents had no formal education, 35.3% had primary education, 10 % had secondary education and 39.2% had tertiary education. 27.5% were males while 72.5% were females. Meanwhile, 13.7% of the respondents had being diabetic for 0-5years, 23.5% had being diabetic for 5-10 years while 62.7% had been diabetic for 10 years and above. 28% were civil servant, 49% were traders while 21% were unemployed. 27.5% are civil servants, 2.9% are artisans, 49% are traders while 20.6% are unemployed .18.6% respondents earn less than 10,000 naira monthly, 61.8%earn between 10,000 – 30,000 and 19.6% earn above 30,000 naira monthly.

Objective 1: The relationship between the knowledge level of hypertension and hypertension control practices of the hypertensive diabetics

Table 2: Chi-square table showing the relationship between the knowledge level of hypertension and hypertensive control practices of people living with hypertension and diabetes

Knowledge	**Control practices of hypertension**			Total	χ^2	df	P
	Good practices	Fair practices	Poor practices				
Above Average	29 (63.0)	12(48.0)	9(29.0)	50			
Average	10(21.7)	13(52.0)	7(22.6)	30	15.517	4	.013
Below Average	7(15.2)	-	15(48.4)	22			
	46(100.0)	**25(100.0)**	**31(100.0)**	**102**			

The results in Table 2 indicated a significant the relationship between the knowledge level of hypertension and hypertensive control practices of the diabetics. Since the calculated chi-square (χ^2) of 15.517 is significant at p-value of .013, the null hypothesis of no significant relationship between the knowledge level of hypertension and hypertensive control practices of the diabetics is rejected while the alternate one is accepted. The findings imply that knowledge level of hypertension is related to hypertensive control practices of the diabetics.

Objective 2: Socio-demographic correlates of the knowledge of hypertension among hypertensive diabetics

Table 3: Socio-demographic correlates of the knowledge of hypertension among people living with hypertension and diabetes

Variable	**Above average**	**Average**	**Below Average**	**X^2 value**	**Df**	**p value**
Age Group						
18-20yrs	4(3.9)	-	-			
21-30yrs	-	3(2.9)	2(2.0)			
31-40yrs	2(2.0)	5(4.9)	4(3.9)			
41-50yrs	6(5.9)	6(5.9)	-	19.83	10	.031**
51-60yrs	11(10.8)	6(5.9)	2(2.0)			
60yr and above	26(25.5)	12(11.8)	13(12.7)			
Educational level						
No formal education	6(5.9)	7(6.9)	3(2.9)			
Primary Education	16(15.7)	11(10.8)	9(8.8)	7.24	8	.249
Secondary	8(7.8)	-	2(2.0)			
Tertiary	19(18.6)	14(13.7)	7(6.9)			
Gender						
Male	12(11.8)	9(8.8)	7(6.9)			
Female	37(36.3)	23(22.5)	14(13.7)	.59	2	.745
Duration diabetics						
0-5yrs	8(7.8)	6(5.9)	-			
6-10yrs	13(12.7)	7(6.9)	4(3.9)	5.53	4	.237
>10 yrs	28(27.5)	19(18.6)	17(16.7)			
Occupation						
Civil servant	17(16.7)	3(2.9)	8(7.8)			

Artisan	-	3(2.9)	-	9.85	6	.041**
Traders	24(23.5)	18(17.6)	8(7.8)			
Unemployed	8(7.8)	8(7.8)	5(4.9)			
Monthly income						
< 10,000	11(10.8)	5(4.9)	3(2.9)			
10,000- 30,000	33(32.4)	18(17.6)	12(11.8)	7.53	4	.094
>30,000	5(4.9)	9(8.8)	6(5.9)			

Table 3 shows the socio-demographic correlates of the knowledge of hypertension among hypertensive diabetics. This study revealed a significant relationship between age (X^2 = 19.83, df = 10, p = .031) and knowledge of hypertension among people living with hypertension and diabetes. Also, occupation was a correlate of knowledge of hypertension among people living with hypertension and diabetes (X^2 = 9.85, df = 6, p = .041). The implication of this is that age and occupation are good correlates of knowledge of hypertension among people living with hypertension and diabetes.

Objective 3: Socio-demographic correlates of the control practices of hypertension among hypertensive diabetics

Table 4: Socio-demographic correlates of the control practices of hypertension among people living with hypertension and diabetes

Variable	Good	Fair	Poor	X^2 value		p value
Age Group						
18-20yrs	-	2(2.0)	2(2.0)			
21-30yrs	3(2.9)	2(2.0)	-			
31-40yrs	4(3.9)	3(2.9)	4(3.9)			
41-50yrs	10 (9.8)	2(2.0)	-	37.13	10	.000**
51-60yrs	11(10.8)	8(17.6)	-			
60yr and above	26(25.5)	17(16.7)	8(17.6)			
Educational level						
No formal education	3(2.9)	9(8.8)	4(3.9)			
Primary Education	10(9.8)	17(16.7)	9(8.8)	18.09	8	.011**
Secondary	8(7.8)	-	2(2.0)			
Tertiary	29(28.4)	6(5.9)	5(4.9)			
Gender						
Male	10(9.8)	9(8.8)	9(8.8)			
Female	30(29.4)	30(29.4)	14(13.7)	1.13	2	.389
Duration diabetics						
0-5yrs	7(6.9)	7(6.9)	-			
6-10yrs	9(8.8)	11(10.8)	4(3.9)	5.81	4	.076
>10yrs	25(24.5)	24(23.5)	15(14.7)			
Occupation						
Civil servant	25(24.5)	3(2.9)	-			
Artisan	1 (1.0)	2(2.0)	-	10.33	6	.023**
Traders	24(23.5)	18(17.6)	8(7.8)			
Unemployed	11(10.8)	10(9.8)	-			
Monthly income						
< 10,000	7(6.9)	9(8.8)	3(2.9)			
10,000- 30,000	30(29.4)	23(22.6)	10(9.8)	5.11	4	.113
>30,000	7(6.9)	7(6.9)	6(5.9)			

Table 4 shows the socio-demographic correlates of the control practices of hypertension among hypertensive diabetics. This study revealed a significant relationship between age (X^2 = 37.13, df = 10, p = .000) and control practices of hypertension among hypertensive diabetics. Also, education (X^2 = 18.09, df = 8, p = .011) and occupation (X^2 = 10.33, df = 6, p = .023) were correlates of control practices of hypertension among hypertensive diabetics. The implication of this is that age, level of education and occupation are good correlates of control practices of hypertension among people living with hypertension and diabetes .

IV. Discussion of Findings

The respondents' socio-demographic revealed that 50% of the respondents were within the ages of 61yrs and above, 39.2% had tertiary education, 72.5% were females, 62.7% had been diabetic for more than 10 years, 49% were traders, 61.8% earn between10,000-30,000 naira monthly. The respondents' socio-demographic characteristics is similar to the findings of Amadi, Amoke and Agbai (2018) in a Screening study on knowledge attitude and management practices of diabetes mellitus and hypertension in Abia state Nigeria, where majority of their respondents over 60years of age, mostly women, and had been diabetic for about 10 years. This could be because the comorbidity are progressive diseases that emerges with increasing age, majority also earn between

10,000 and 30,000 because they are mainly aged people. Majority are also unemployed which might be because they are within the age range of retirees.

The outcome of this study revealed that there is a statistically significant relationship between the knowledge level of hypertension and hypertensive control practices of the people living with hypertension and diabetes. This outcome is in line with the findings of Tahir et al (2018) in his study on knowledge, attitude and practices of patients regarding diabetes and hypertension control found a statistically significant association between the knowledge of respondents and practice score. It also tallies with the findings of Buang, Rahman, and Haque (2019) who found a positive association between knowledge and practice of hypertension control. This might be because the more knowledge of the complication of the comorbidity, how to control and the benefit of control the respondents possesses, the more respondent' stimulus to engage in beneficial practices that can prevents complications.

The socio-demographic correlates of the knowledge of hypertension among people living with hypertension and diabetes revealed a significant relationship between age, occupation and knowledge of hypertension among people living with hypertension and diabetes . The implication of this is that age and occupation are good correlates of knowledge of hypertension among people living with hypertension and diabetes .The outcome of this study on age as a correlate of hypertensive diabetic's knowledge of hypertension. This is in line with the findings of Aghoja, Okinedo and Odili (2016) that age significantly affected respondent's knowledge of hypertension. This might be true as hypertension is more common among the older age group. Diabetics also becomes more experienced at self-care with increasing age which also tallies with a study carried out in Asia by Liew, et al,(2019) who documented that age was significantly associated with the knowledge of hypertension.

The socio-demographic correlates of the control practices of hypertension among people living with hypertension and diabetes revealed significant relationship between age, education, occupation and control practices of hypertension among people living with hypertension and diabetes. The implication of this is that age, level of education and occupation are good correlates of control practices of hypertension among people living with hypertension and diabetes.This corroborates the findings of Aghoja, Okinedo and Odili (2017) in their study of knowledge, attitude, and practices of hypertensive patients towards hypertension in a secondary health care facility in Delta state where it was found that age, occupation, marital status and duration of hypertension significantly affected respondent's knowledge and control practice of hypertension. It also tallies with the findings of Rashidi, et al, (2018) who found that educational level of the respondents was significantly associated with the respondents control practice level. This might be as a result of experience and lessons that they might have learnt in the course of managing the commodities over the years with increasing age. The more educative tend to pick this lessons easily and with higher purchasing power from occupation, patient try to acquire needed food and instruments to practice what is right so as to avoid negative consequences of inaction.

V. Conclusion

The study concludes that knowledge level of hypertension is related to hypertensive control practices of the diabetics. The study also concludes that age and occupation are good correlates of knowledge of hypertension among hypertensive diabetics while age, level of education and occupation are good correlates of control practices of hypertension among people living with hypertension and diabetes.

VI. Recommendations

The following recommendations are made;

1. Knowledge of hypertension should be increased through mass media campaign on the prevalence of hypertension among the diabetics, how hypertension can be controlled and the havoc of uncontrolled hypertension including the lifestyle modifications that can enhance its control among the diabetics.
2. Commencement/modification of nursing health education sections and role play that can help improve the diabetic's knowledge of hypertension control at every clinic days.

References

[1]. Aghoja, O.C., Okinedo, P.O., Odili ,V.U. (2017).Knowledge ,attitude and practices of hypertensives in secondary health facilities in delta state. *Journal of pharmaceutical and bioscience*. 5(2),24-33.http://dx.doi.org/10.20510/ukjpb/5/12/155972

[2]. Amadi, A.N.C., Amoke O.C, & Agbai P.O (2018) Screening , knowledge, and management Practices of diabetes mellitus and hypertension in Amaba Ikwuano Abia State Nigeria. *Journal of Nutrition and Dietetics*.1(1),1

[3]. Aniedi, U., Ekong, A. & Idung, A. (2018) Hypertension among type 2 diabetic patients in Uyo South East Nigeria.*Journal of advance in medicine and medical research*. 26(6), 1-6. https: // doi.org /10.9734/JAMMR/2018/40604.

[4]. Buang, N.F.B., Rahman, N.A.A., & Haque, M., (2019). Knowledge,attitude and practice regarding hypertension among residents in an housing area in Selangor Malaysia, 92(2), 145-152. https://doi.org/ :10.15386/mpr-1227

[5]. Jacob, A., & Siddiq, A (2018) Prevalence and pattern of hypertension in diabetic patients in tertiary care hospital. *Pharmaceutical and bioscience Journal.* http://dx.doi.org/10.20510/ukjpb/6/i3//175589

[6]. Kintscher, U. (2015). Benefit of blood pressure control in diabetes patients. https://doi.org/10.1007/s/1906-015-0561-1.

[7]. Liew, S.J., Lee, J.T., Tan, C.S., Koh ,C.H.G., Dam, R.V. and Riemenschneider, F.M. (2019). Socio-demographic factors in relation to hypertension prevalence, awareness, treatment and control in a multi-ethnic Asian population: a cross-sectional study. *BMJ Open*, Retrieved from http://bmjopen.bmj.com/

[8]. Nouh, F., Omar, M. & Younis, M. (2017). Prevalence of Hypertnesion among Diabetic Patients in Benghazi: A study of associated factors. https://doi.org/:10.9734/AJMAH/2017/35830.

[9]. Onuoha F.M & Egwin J.I (2017). Hypertension among the diabetics assessing care in a primary care setting in South-Eastern Nigeria. *Journals of Diabetes and Clinical Studies*. 1,1. Retrieved from https://www.semanticscholar.org

[10]. Passarella, P., Kiseleva, T.A., Valeeva, F.V., Gosmanov, A.R. (2018). Hypertension management in diabetes. *American diabetes association*. 31(3), 218-244.https://doi/org/:10.2337/ds17-0085

[11]. Rashidi, Y., Manaflouyan, H., Azar, F.P, Nikniaz, Z., Nikniaz, L., & Gaffari, S. (2018). Knowledge attitude and practices of Iranian hypertensive patients regarding hypertension. *Journal of cardiovascular ane thoracic research*, 10(1). 14-19

[12]. Sintayehu, M., Tsegaye, M., Legese, C and Desta, A., (2017). Blood pressure control and its determinants among diabetes mellitus co-morbid hypertensive patients at Jimma University Medical Center, South West Ethiopia. https://doi/org/:10.1186/s/40885-017-0035-x.

[13]. Tadesse, K., Amare, H., Hailemariam, T., Gebremariam, T. (2018). Prevalence of Hypertension among patients with type 2 DM and its Socio-Demographic Factors in Nigist Ellen Mohammed Memorial Hospital Hosanna, Southern Ethiopia . *J. Diabetes Metab*.9,4. https://doi/org/:10.4172/2155-6156.1000

[14]. Tahir,Q., Azam, N., Imran M., Hashmi, A. Zeb, A., Furqan, A. (2018). Knowledge, attitude and practices of patients regarding diabetes and hypertension control. *J Postgrad Med Inst* . 32(2): 166-72.Retrieved from https://www.researchgate.net

[15]. World Health Organization (2016).Africa has the highest rate of high blood pressure, WHO says. Retrieved from http://www.bbc.com/news/world-africa-38377481

[16]. World Health Organization (2019). Hypertension key facts. Retrieved from https://www.who.int

[17]. Yang, H., Gao, J., RenL., Li, S., Chen, Z., Huang, J., Zhu, S., & Pan, Z. (2017). Association between Knowledge-Attitude-Practices and Control of Blood Glucose, Blood Pressure, and Blood Lipids in Patients with Type 2 Diabetes in Shanghai, China: A Cross-Sectional Study. *Journal of Diabetes Research* .https://doi.org/10.1155/2017/3901392