Assessing Quality of Life among Patients with Diabetes Mellitus, Hypertension or Both Diseases in Al-Najaf Province /Iraq

Ali S. Al-Ibrahimy[*,1] and Haydar F.Al-Tukmagi[**]

[*] Department of Clinical Pharmacy, College of Pharmacy, University of Kufa, AL-Najaf , Iraq.
[**] Department of Clinical Pharmacy, College of Pharmacy, University of Baghdad, Baghdad Iraq.

Abstract

With growing prevalence, diabetes mellitus will be possibly the most principal cause for morbidity and mortality in next years. The predominance of diabetes mellitus has been increased over the last decades, where the occurrence of disease is anticipated to increase to 592 million at 2035. Essential hypertension is chronic non-communicable disease which considered the major risk factor for many diseases. The world health organization estimates that the hypertensive patients will reach 1 billion or more at year 2025. The purpose of insertion of quality of life as indicator for health outcome is due to sensitivity of this measure for patients' evaluations of their health status after taken treatment and its health outcome. This study is a cross-sectional survey. The total number of participants in this study was 775 individuals which divided into four groups: healthy control group, patients with diabetes mellitus only, hypertension only and patients with both diabetes mellitus and hypertension. The questionnaire used to assess quality of life is Arabic version of (WHOQOL- BRIEF). The mean scores of the four domains of QOL instrument for diabetic, hypertensive and diabetic hypertensive patients were statistically significant lower than corresponding domains of control group. In conclusion, one chronic disease affects quality of life and combination of two chronic diseases affect quality of life to greater extent.

Keywords: Diabetes mellitus, Hypertension, Quality of life, WHOQOL- BRIEF.

تقييم نوعية الحياة الصحية لدى مرضى داء السكري من النوع الثاني و / او إرتفاع ضغط الدم في محافظة النجف الأشرف ـ العراق

علي شلاش الابراهيمي[*,1] و حيدر فخري التكمه جي [**]

[*]فرع الصيدلة السريرية ، كلية الصيدلة ، جامعة الكوفه ، النجف ، العراق .
[**] فرع الصيدلة السريرية ، كلية الصيدلة ، جامعة بغداد ، بغداد ، العراق .

الخلاصة

مع الانتشار المتزايد، فإن مرض السكري ربما يكون السبب الرئيسي للامراض والوفيات في السنوات المقبلة. وساد هذا المرض بصورة كبيرة في العقود الأخيرة ، حيث من المتوقع أن يزداد عدد المصابين بهذا المرض إلى ٥٩٢ مليون في عام ٢٠٣٥ أما ارتفاع ضغط الدم الأساسي هو من الأمراض المزمنة غير المعدية التي تعتبر عامل الخطر الرئيسي لكثير من الأمراض حيث تقدر منظمة الصحة العالمية أن عدد مرضى ارتفاع ضغط الدم سيصل إلى مليار أو أكثر في عام ٢٠٢٥. يرجع الغرض من إدراج دراسة نمط الحياة كمؤشر للنتائج الصحية إلى قدرة هذا العامل على الكشف عن تقييم المرضى لحالتهم الصحية بعد اخذ العلاج حيث ان هذه دراسة شاملة مستعرضة لمرضى الضغط والسكري اجريت على ٧٧٥ شخص مقسمين على اربعة مجموعات التي تشمل المجموعة الضابطة ومجموعة مرضى الضغط و مجموعة السكري ومجموعة الضغط والسكري معا. تم استخدام النسخة العربية الموجزة لاستبيان منضمة الصحة العالمية حول نمط الحياة. أظهرت هذه الدراسة ان معدل الدرجات للمجالات الاربعة (البدني والنفسي والاحتماعي والبيئي) قد تأثرت بدرجة يعتد بها احصائيا مقارنة مع درجات هذه المجالات عند الأشخاص الاصحاء في المجموعة الضابطة.وبذلك يمكن الاستنتاج بان المرض المزمن الواحد يؤثر على كافة مجالات الحياة التي قيست في هذا الاستبيان بدرجة معتد بها احصائيا اما اذا اجتمع مرضان مزمنان فانهما يؤثران بدرجة اكبر.

الكلمات المفتاحية : مرض السكري ، ارتفاع ضغط الدم ، نوعية الحياة ، النسخة الموجزة لاستبان منظمة الصحة العالمية.

Introduction

Diabetes mellitus (DM) is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both [(1)]. The long-term effects of these metabolic irregularities lead to appearance of chronic complications of diabetes mellitus [(2)]. These complications can affect many organ systems. The diabetic complications are divided into macrovascular and microvascular complications [(3)]. The predominance of DM has been increased over the last decades ,where the occurrence of disease is anticipated to increase to 592 million at 2035 [(4)]. According to World Health Organization (WHO) eastern Mediterranean region, the prevalence of DM in Iraq was (668,000) by 2000 and is expected to increase to (2009, 000) by 2030.

[1]Corresponding author E-mail: alipharm1989@yahoo.com
Received:29 /7/2017
Accepted: 21/9/2017

There are many subtypes of DM present, but the type-1 diabetes mellitus (T1DM) and type-2 diabetes mellitus (T2DM) are the most common form of the disease and account for approximately 95 ٪ of overall cases [5]. The T1DM takes 5-10٪of the cases; while, T2DM accounts for ~90% of cases [6]. Hypertension is chronic non-communicable disease in which there is persistent elevation of systolic and/or diastolic blood pressure of ≥ 140/90 mm Hg; it may be considered the major risk factor for cardiovascular, cerebrovascular and renovascular diseases [7-9]. In 2008 the prevalence of hypertension worldwide is about 40% in adults of 25 years and above [10]. The WHO estimate that the hypertensive patients will reach 1 billion or more at year 2025 [11]. The World Health Organization defines quality of life as "an individual's perception of their position in life in the context of the culture and value systems in which they live, and in relation to their goals, expectations, standards, and concerns [12]. The purpose of insertion of quality of life (QOL) as indicator for health outcome is attributed to the sensitivity of this measure for the evaluation of patients health status after taken treatment and its health outcome; where, the evaluation of quality of life is important because this evaluation can determine the aspects that are significant for quality of life of patients [13, 14] because the ultimate goal for treatment of chronic non-curable diseases like diabetes mellitus and hypertension is to improve the quality of life of such patients [15]. QOL's value is important for knowing what is significant to the individuals' QOL [13, 14] due to the principal goal for non-curative disease is to improve QOL [15]. Diabetes mellitus (DM) as indicated by many studies to be independently associated with reduced levels of quality of life as evidenced by negative relationship between DM and many aspects of life like physical, mental, and social, financial aspects of individuals [16-18]. The diabetic patients require controlling the symptoms of disease and adhering to complex regimens of treatment [19]. Thus, the impact of diabetes mellitus on quality of life can be analyzed into two interdependent aspects: the consequences attributed to the disease-related stressors and the burden imposed by the treatment demanding thus both the disease-related stressors and the burden if treatment of this disease may increase the risk making person more susceptible to the poor QOL [19]. Several investigators have indicated that hypertension can seriously affect QOL and patients well-being; where, it was shown that the known hypertensive patients have poorer QOL because the diagnosis of hypertension increases the sensitivity of patients toward bodily symptoms and make an otherwise "healthy" person ill [20].

Method

This study is a cross-sectional survey conducted to determine the impact of DM and hypertension on QOL in Iraqi patients in AL-Najaf AL-Ashraf province. The total number of participants in this study was 775 individuals which divided into four groups including healthy control group (190 persons), type-2 diabetic patients (194 patients), hypertensive patients (195 patients) and patients with both T2DM and hypertension (196 patients). The study was approved by Scientific Committee of the College of Pharmacy–Baghdad University. The participants in this study including known T2DM and hypertensive patients who attended at community pharmacies in urban and rural areas. After explaining the aims of the study to patients, the agreement of participation was obtained and the questionnaire provided to eligible individual. The identification of diabetic or hypertensive patients ensued after asking the patients to answer the question "do you have any of the following diseases diagnosed by doctor: DM, hypertension or DM plus hypertension". The inclusion criteria involve all patients with T2DM, hypertension or both diseases who visited community pharmacy. The diabetic- and hypertensive- patients should be treated at least six month before enrollment in the study. The exclusion criteria include pregnant- or breast-feeding women, patients with any other co-morbidity not related to disease and patients who cannot complete the QOL measures because of psychiatric or cognitive impairments that affect memory or judgment. The questionnaire was provided to all patients to be self-reported with exception of illiterate patients that were interviewed by trained community pharmacists who also report the treatment that has been taken by the patients. Furthermore, such questionnaire contain organized questions such as - demographic information (gender, age, education level, marital status, occupation, residence), - duration of disease, -family history, and - smoking status. The questionnaire for the assessment of QOL of persons is the Arabic version of World Health Organization QOL–Short Version questionnaire (WHOQOL-BRIEF) was utilized [21, 22]. This questionnaire comprised of four domains each one measure specific aspect of life namely physical, psychological,

social and environmental domains. In addition, it also contains two other questions that ask about the general health and general quality of life. Consequently this instrument has 26 questions. Each item rated according to five points likert scale with arrangement in positive direction thus, high score refer to better QOL; while, low score mean lower quality of life. The total score of domain was calculated by summation of scores of items that included in this domain after reverse the direction of three items in this questionnaire which are questions (3, 4 and 26). Then calculate the mean of scores for each domain and use this mean to convert the domain score to (4-20) range by multiplying the mean by 4**.** Then transformation to (0-100) range occur by use this formula ((score – 4) * 100/16). The sum of scores of four domains produces overall value of quality of life. The duration of study continued from November (2016) to March (2017). The statistical analysis performed by using IBM SPSS Statistics version 23. The categorical variables represented by descriptive statistics like percentages and frequencies. The Continuous variables were presented as (Means ± SD). The internal reliability of questionnaire is evaluated by Cronbach's alpha while Student's t-test , Mann-Whitney Test and Kruskal Wallis Test are used to compare between means of unpaired groups. When more than 20% of data was missed from assessment, the assessment was discarded. When the score of single item was missed the mean of other items was used to substitute the missing value. When two items were coded missing , the domain score was not computed with the exception of domain 3, where the domain should only be calculated if < 1 item is missing) [23].

Results

The internal reliability of questionnaire based on Cronbach's alpha value is (0.88) and for domains is ranged from (0.65) for social domain to (0.85) for physical domain indicates good internal consistency. Also, Pearson correlation coefficient show significant correlation between each item and the domain that comprise it. The mean age diabetic, hypertensive, DM plus hypertension patients and control group include 51.18 ± 10.220, 51.90 ± 10.928, 56.03 ± 8.878 and 50.05 ± 9.20 years respectively. The male participants for all groups are greater than female participants (Table 1).

Table (1): Age of the study groups (Mean ±SD)

study groups	Age (**Mean ±SD years)**	**Range (years)**
Diabetic patients	51.18 ± 10.220	32-78
Hypertensive patients	51.90 ± 10.928	25-84
Diabetic hypertensive patients	56.03 ± 8.878	37-80
Control group	50.05 ± 9.20	33- 67

Table(2): Distribution of participants according to rural or urban area

Study groups	**Number of participants in rural area (AL-ABASIA) (7 community pharmacy)**	**Number of participants in urban area (30 community pharmacy)**
Diabetic patients	29 (14.9)	165 (85.1)
Hypertensive patients	37 (19)	158 (81)
Diabetic hypertensive patients	18 (9.2)	178 (90.8)
Control group	22 (11.6)	168(88.4)

The majority of type 2 diabetic patients (35.6 %) have secondary educational level; while, the illiterate patients take highest percent (29.7 %) among hypertensive patients but majority of (38.8 %) hypertensive diabetic patients have primary school educational level and finally the most of control group individuals (44 %) have college educational level (Table 3). The majority of participants of all groups were married (Table 3). The mean scores of the four domains of QOL instrument for diabetic patients were statistically significant lower (P<0.001) than corresponding domains of control group (Table 5) also the mean scores of the four domains of QOL instrument for hypertensive patients were statistically significant lower (P<0.001) than corresponding domains of control group (Table 6). The mean scores of the four domains of QOL instrument for diabetic hypertensive patients were statistically

significant lower (P<0.001) than corresponding QOL scores (OQOL) for all patients group were significantly lower (P<0.001) than that of control group (Table 8). The comparison of mean of overall quality of life values between patients group showed that the effect of T2DM and hypertension were non-significantly different (P>0.05); while the presence of T2DM domains of control group (Table 7). The overall and hypertension together reduce the value of mean overall quality of life (OQOL) significantly (P<0.05) when compared with T2DM alone and hypertension alone (Table 9). Figures (1, 2, 3, and 4) illustrated the response to first two questions about general health and QOL.

Table (3): Demographic characteristics of study participants

Variable		Diabetic	Hypertensive	Diabetic hypertensive	Control		p-value
Gender	Male	108(55.7)	101 (51.8)	101 (51.5)	98 (51.6)		0.813
	Female	86 (44.3)	94 (48.2)	95 (48.5)	92 (48.4)		
Education level	illiterate	42 (21.6)	58 (29.7)	48 (24.5)	11 (5.8)		0.001
	primary school	63 (32.5)	53 (27.2)	76 (38.8)	19 (10.0)		
	secondary school	69 (35.6)	51 (26.2)	55 (28.1)	75 (39.5)		
	collage	20 (10.3)	33 (16.9)	17 (8.7)	85 (44.7)		
Marital status	single	4 (2.1)	6 (3.1)	4 (2.0)	10 (5.3)		0.165
	married	172 (88.7)	153 (78.5)	162 (82.7)	155 (81.6)		
	Widowed	13 (13.7)	31 (15.9)	26 (13.3)	20 (10.5)		
	Divorced	5 (2.6)	5 (2.6)	4 (2.0)	5 (2.6)		
Duration of Disease	Less than 1 year	11 (5.7)	10 (5.1)	5 (2.6)*	8 (4.1)**	--- ---	0.001
	1- 5 year	72 (37)	91 (46.7)	45(22.9)*	75(38.3)**	--- ---	
	6 – 10 years	46 (24)	54 (27.7)	58(29.6)*	54(27.5)**	--- ---	
	More than 10 years	65 (33.3)	40 (20.5)	88(44.9)*	59(30.1)**	--- ---	
Residence	Urban	165 (85.1)	158 (81)	178 (90.8)	168(88.4)		0.030
	Rural	29 (14.9)	37 (19)	18 (9.2)	22 (11.6)		
Occupation	Employed	43 (22.2)	48 (24.6)	37 (18.9)	72 (37.9)		0.001
	Non employed	151 (77.8)	147 (75.4)	159 (81.1)	118 (62.1)		

Continued table (3)

Variable		Diabetic	Hypertensive	Diabetic hypertensive	Control	p-value
Family history	Yes	128 (66)	149 (76.4)	132 (67.3)	------	0.051
	No	66 (34)	46 (23.6)	64 (32.7)	------	
Smoking habit	Smoker	39 (20.1)	40 (20.5)	46 (23.5)	44(23.2)	0.752
	Non smoker	155(79.0)	155 (79.5)	150 (76.5)	146 (76.8)	
Treatment	Diet only	3 (1.6)	9 (4.6)	1 (0.5)	------	0.001
	One drug	58 (29.8)	109 (55.9)	------	------	
	Two drugs	123(63.5)	58 (29.8)	43 (21.9)	------	
	Three drugs	13 (6.7)	16 (8.2)	103 (52.5)	------	
	Four drugs	------	2 (1.0)	42 (21.5)	------	
	Five drugs	------	1 (0.5)	5 (2.6)	------	
	Six drugs	------	------	2 (1.0)	------	

*mean duration of diabetes mellitus , ** mean duration of hypertension

Table (4): Number and type (s) of drug(s) taken by diabetic patients

Drug number	Percent %	Drug class(s)	Percent %
One drug	58 (29.8)	Sulfonylurea	11 (18.9)
		Biguanide	16 (28.3)
		Insulin	31 (52.8)
Two drugs	123 (63.5)	Insulin + biguanide	62 (50.4)
		Sulfonylurea + biguanide	58 (47.2)
		DPP4I+ biguanide	2 (1.6)
		Insulin +sulfonylurea	1 (0.8)
Three drugs	13 (6.7)	Insulin+sulfonylurea+biguanide	7 (53.8)
		DPP4I+sulfonylurea+biguanide	6 (46.2)

DPP4I:dipeptidyl peptidase -4 inhibitor

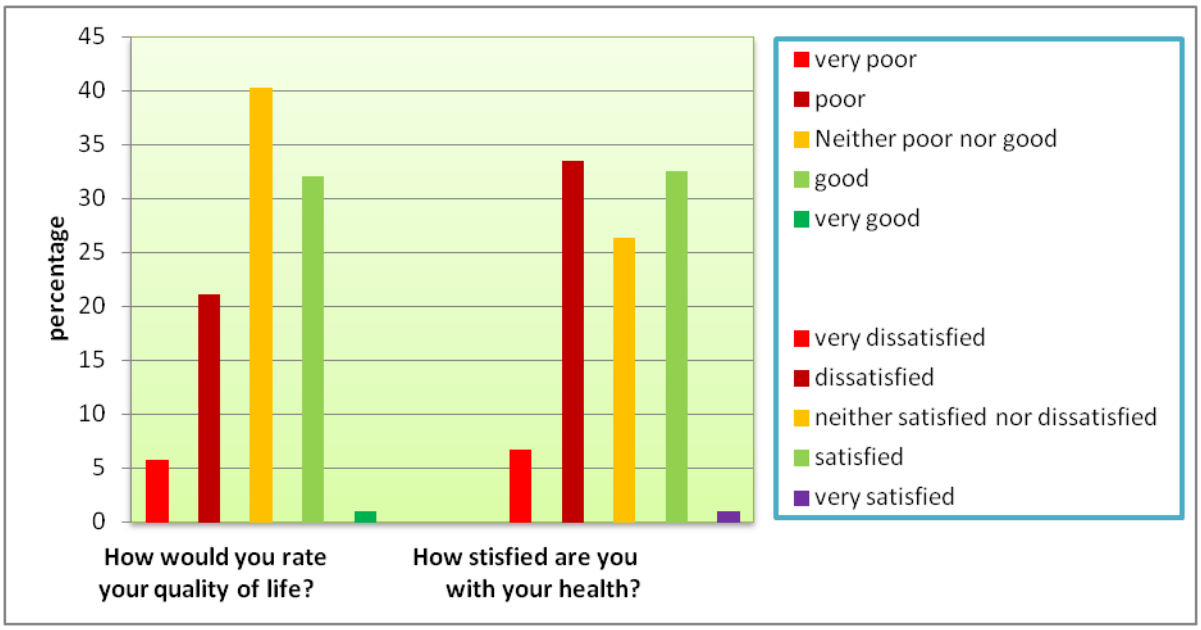

Figure (1) :The proportion of responses of diabetic group for first two items of WHOQOL-BREF about the perception of general health and quality of life. WHOQOL-BREF = World Health Organization Quality of Life- Brief questionnaire .

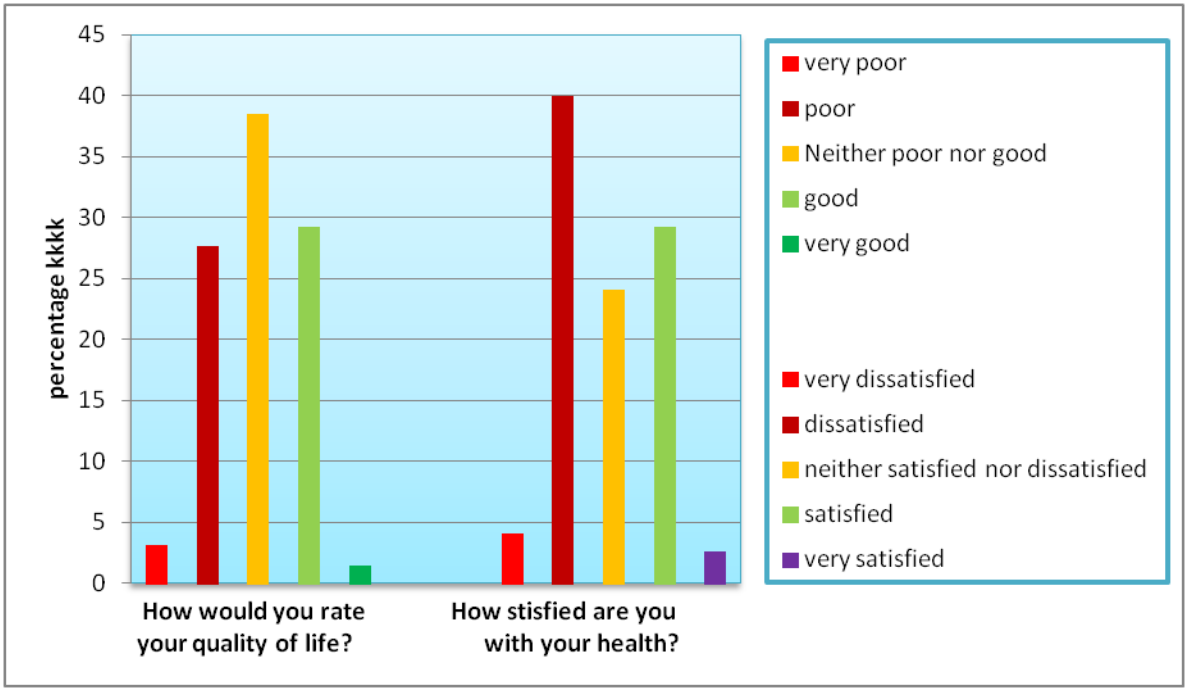

Figure (2) :The proportion of responses of hypertensive group for first two items of WHOQOL-BREF about the perception of general health and quality of life. WHOQOL-BREF = World Health Organization Quality of Life- Brief questionnaire

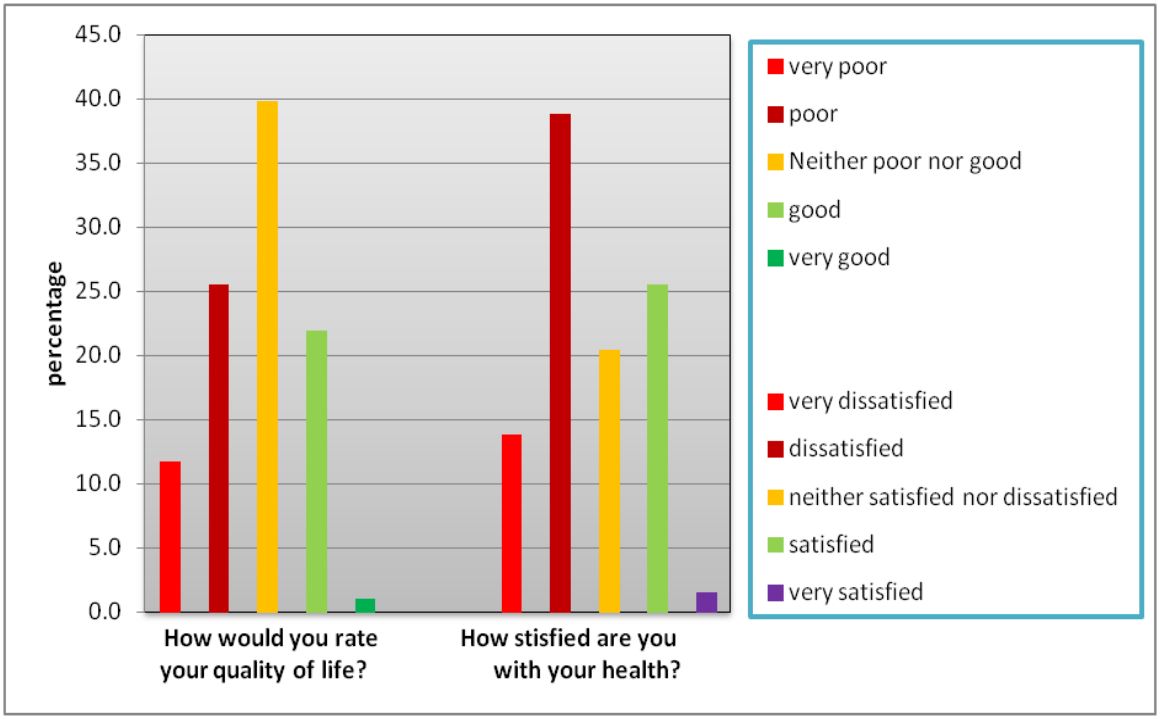

Figure (3) :The proportion of responses of diabetic hypertensive group for first two items of WHOQOL-BREF about the perception of general health and quality of life. WHOQOL-BREF = WorldHealth Organization Quality of Life- Brief questionnaire

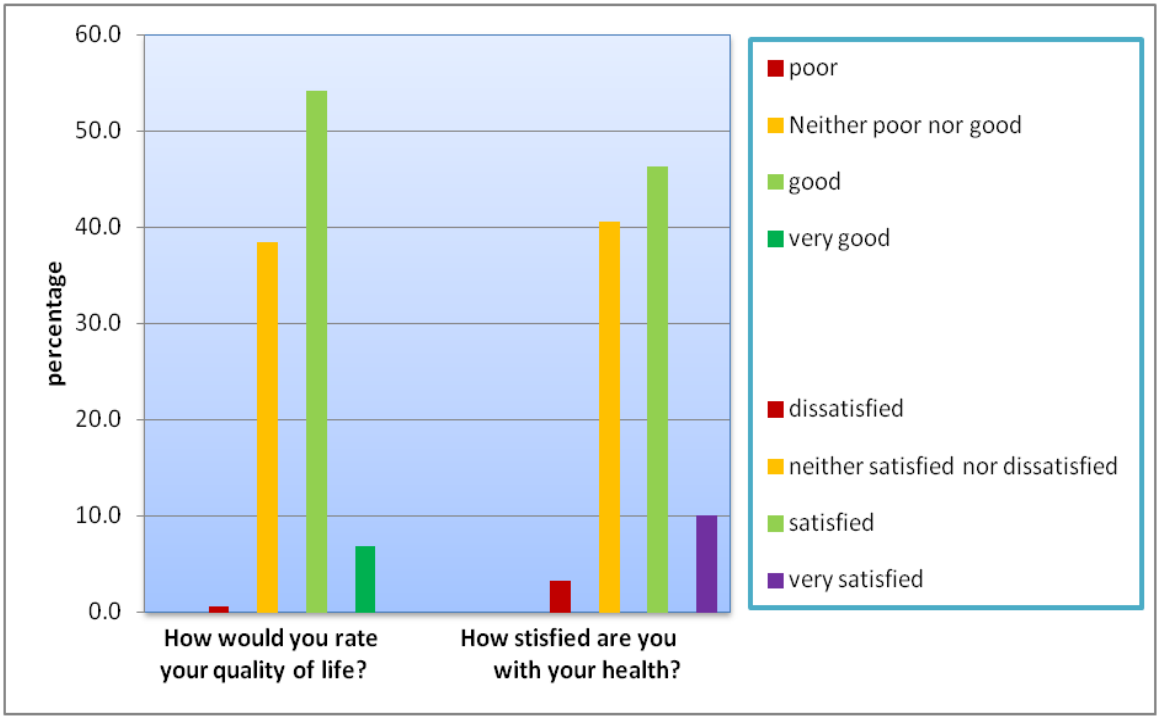

Figure (4) :The proportion of responses of control group for first two items of WHOQOL-BREF about the perception of general health and quality of life. WHOQOL-BREF = World Health Organization Quality of Life- Brief questionnaire.

Table(5): Comparison of QOL domain scores between DM patients and control group

Scale	Domain	Diabetic group	Control group	p- value
4-20	Physical	11.32 ± 3.59	14.50 ± 1.86	< 0.001
	Psychological	12.29 ± 2.60	14.27 ± 1.58	< 0.001
	social	12.78 ± 2.77	14.73 ± 2.05	< 0.001
	Environmental	11.61 ± 2.31	13.44 ± 1.41	< 0.001
0-100	Physical	45.80 ± 22.45	65.68 ± 11.60	< 0.001
	Psychological	51.82 ± 16.28	64.18 ± 9.93	< 0.001
	Social	54.89 ± 17.31	67.10 ± 12.85	< 0.001
	Environmental	47.59 ± 14.47	59.01 ± 8.86	< 0.001

QOL: quality of life , DM : diabetes mellitus

Table (6): Comparison of QOL domain scores between hypertensive patients and control group

Scale	Domain	Hypertensive group	Control group	p- value
4-20	Physical	11.52 ± 2.69	14.50 ± 1.86	< 0.001
	Psychological	12.76 ± 2.38	14.27 ± 1.58	< 0.001
	social	13.43 ± 3.04	14.73 ± 2.05	< 0.001
	Environmental	11.89 ± 2.01	13.44 ± 1.41	< 0.001
0-100	Physical	47.03 ± 16.81	65.68 ± 11.60	< 0.001
	Psychological	54.78 ± 14.91	64.18 ± 9.93	< 0.001
	Social	58.97 ± 19.01	67.10 ± 12.85	< 0.001
	Environmental	49.34 ± 12.58	59.01 ± 8.86	< 0.001

QOL: quality of life

Table (7): Comparison of QOL domain scores between diabetic hypertensive patients and control group.

Scale	Domain	DM plus hypertension	Control group	p- value
4-20	Physical	10.20 ± 3.32	14.50 ± 1.86	< 0.001
	Psychological	11.74 ± 2.87	14.27 ± 1.58	< 0.001
	social	12.41 ± 3.01	14.73 ± 2.05	< 0.001
	Environmental	11.04 ± 2.24	13.44 ± 1.41	< 0.001
0-100	Physical	38.77 ± 20.77	65.68 ± 11.60	< 0.001
	Psychological	48.38 ± 17.94	64.18 ± 9.93	< 0.001
	Social	52.59 ± 18.81	67.10 ± 12.85	< 0.001
	Environmental	44.03 ± 14.02	59.01 ± 8.86	< 0.001

QOL: quality of life , DM : diabetes mellitus

Table(8): Comparison of overall QOL value (OQOL) between patients groups and control group

Patients group	Value of (OQOL) for patients group	Value of (OQOL) for Control group	p- value
DM patients	50.03 ± 14.94	63.99 ± 8.19	< 0.001
Hypertensive patients	52.53 ± 11.86	63.99 ± 8.19	< 0.001
DM plus hypertension	45.94 ± 15.10	63.99 ± 8.19	< 0.001

OQOL : overall quality of life , DM : diabetes mellitus

Table(9): Comparison value of (OQOL) between patients groups

First group	**OQOL** (Mean ±SD)	other group	**OQOL** (Mean ±SD)	p- value
DM	50.03 ±14.94	Hypertension	52.53±11.86	0.08
DM plus hypertension	45.94± 15.10	DM	50.03 ±14.94	0.02
DM plus hypertension	45.94± 15.10	Hypertension	52.53±11.86	< 0.001

OQOL: overall quality of life, DM: diabetes mellitus

Discussion

This study showed that DM has significant impact on all domains of QOL as compared to control group and this supported by other studies like Ashraf Eljedi *et al.* [24] and Zivcicova *et al.* [25] and the physical domain was affected to greater extent than other domains and this consistent with Ahari *et al.* [26] and Boon-How Chew *et al.* [27]. The social domain is affected to minor extent than other domains probably due to prevalence of social support for these persons and this also supported by Boon-How Chew *et al.* [27]. Hypertension affects all aspects of QOL. The scores of four domains in hypertensive patients are significantly ($p < 0.001$) lower than the scores of control group where the physical domain is affected more while the social domain is least affected among all domains of WHOQOL-BREF questionnaire and this result is consistent with the result obtained in Brazil [28] and Xianglong Xu *et al.* that represent that the HQOL is significantly affected by hypertension although it use another instrument for measurement of QOL like SF-36 [29]. The presence of T2DM and hypertension in same individual further lower the scores of QOL than DM or hypertension alone where the scores of all domains is significantly very lower than the scores of these domains in healthy individuals due to burden of both disease and its complications and treatment on patients quality of life. When the patient suffers from single chronic illness, the only perception of being have chronic disease is enough to compromise the QOL [30, 31]. The T2DM alone and hypertension alone produce comparable effect on QOL where the mean of overall QOL (OQOL) of diabetic patients is (50.03) whereas the mean of (OQOL) of hypertensive patients is (52.53) and the ($p > 0.05$) and this is supported by Tamara Poljicanin *et al.* study [32]. The mean score of (OQOL) of diabetic hypertensive patients is poorer than that for patients with T2DM alone or hypertension alone and this consistent with the result obtained by Hwee-Lin Wee *et al*. [33].

The present study indicate that the combination of T2DM and other chronic non-communicable disease like hypertension can further lower the scores of QOL domains especially physical domain which is decreased to greater extent than other domains and this is supported by *Otiniano ME et al.* [34] and *Oldridge NB et al.* [35]. Also the participants of this study were drawn from general population so the findings of this study can be easily generalized to large scale population [36]. Also the results of this study indicate that the presence of T2DM and hypertension not only rise the healthcare costs [37] and mortality [38] but also increase the physical and psychological load of these diseases on patients. The strengths of this study are use of generic questionnaire which explain the wider effect of DM and hypertension on various aspects of life. The WHOQOL-BREF was characterized by good reliability and acceptable validity in cross-sectional studies over 23 nations [39]. Other factors that strength this study is relatively large size sample and presence of control group.

Conclusion

According to the results obtained from this study, it can be concluded that patients with T2DM alone have significant lowering of mean scores of all domains of QOL and mean of overall QOL compared to control group with physical domain was highly affected and social domain was least affected. Also, hypertension alone has significant negative impact on QOL. While the diabetic hypertensive patients have poorer QOL than control group. The hypertension and T2DM have comparable impact on QOL; while the presence of T2DM plus hypertension negatively affects all domains of QOL to greater extent than T2DM alone or hypertension alone. The benefits of this study are: (1) determination of impact of chronic diseases like diabetes mellitus or hypertension on health related quality of life which considered as indicator for health outcome, (2): comparison of effect of presence of two chronic diseases in same patients versus one chronic disease (3) determine the aspects of life that were influenced by presence of diabetes and hypertension and determine which aspect is affected to greater extent (4) indicate that great attention is required for patients with diabetes or hypertension by activation of screening system for early detection of diabetes and hypertension and so enable for prevention, prevent the progression , and treatment of such diseases and its complications (5) this study determine that patients with diabetes or hypertension have poor quality of life and so further investigation is required to determine the causes and so improve the QOL of such patients.

Acknowledgements

I would like to thank for all community pharmacists who participate in collection of data.

References

1. American DM Association. Definition of DM mellitus. Diabetes Care Volume 37, Supplement 1, January 2014.
2. Alvin C. Powers. HARRISON'S principles of internal medicine, 19th Edition, McGraw-Hill Education , London.Copyright © 2015; P : 2399-2400.
3. Brian K. Alldredge, Robin L. Corelli, Michael E. Ernst, B. Joseph Guglielmo,Pamala A. Jacobson, Wayne A. Kradjan, Bradley RWilliams. Applied Therapeutics: The Clinical Use of Drugs , tenth edition. Lippincott williams&wilkins, Philadelphia,copyright 2013; p: 1223-1225.
4. Guariguata, L; Whiting, D; Hambleton, I; Beagley, J; Linnenkamp, U; EShaw, J . Global estimates of DM prevalence for 2013 and projections for 2035. DM Research and Clinical Practice. ELSEVIER. 2014; 103:137-149.
5. World Health Organisation. Definition and diagnosis of DM mellitus and intermediate hyperglycaemia. Report of a WHO/IDF consultation; 2006.Available from: http://www.who.int/DM/publications/diagnosis_DM2006/en/.
6. Public Health England. Adult Obesity and Type 2 DM; 2014. Available from: https://www.gov.uk/government/publications/adult
7. Larry, E Fields, Vicki L. Burt, Jeffery A. Cutler, Jeffrey Hughes, Edward J. Roccella, PaulSorli. The Burden of Adult Hypertension in the United States 1999 to 2000. Hypertension. 2004; 44(4):398-404.
8. Licy L YanesJane, F. Reckelhoff. Postmenopausal Hypertension .Am J Hypertens. 2011; 24 (7): 740-749.
9. Kwok Leung Ong, Bernard M.Y. Cheung, Yu Bun Man, Chu Pak Lau, Karen S.L.Lam. Prevalence, Awareness, Treatment, and Control of Hypertension Among United States Adults 1999–2004.Hypertension. 2007; 49:69-75.
10. .Saleh, Farah R., Razhan S. Othman, and KarzanA.Omar."Prevalence of Hypertension among Young and Adults in the Kurdistan Region."Journal of Chemical, Biological and Physical Sciences (JCBPS). 2016; 6(2): 344.
11. Yongqing, Z., Ming, W., Jian, S., Pengfei, L., Xiaoqun, P., Meihua, D., ...& Ping, L. Prevalence, awareness, treatment and control of hypertension and sodium intake in Jiangsu Province, China: a baseline study in 2014. BMC public health.2016; 16(1): 56.
12. Komal Verma[1], Meenal Dadarwal. Diabetes and quality of life: A theoretical perspective. J Soc Health Diabetes 2017;5:5-8
13. Komal Verma, MeenalDadarwal.DM and quality of life: A theoretical perspective. J Soc Health DM. 2017; 5(1):5-8.
14. Robinson, Peter G., Alison J. Carr, Irene J. Higginson. "How to choose a quality of life measure." Quality of Life. London. BMJ Books. 2003; 88-100.
15. Carr, Alison J., and Irene J. Higginson. "Measuring quality of life: Are quality of life measures patient centred?." BMJ: British Medical Journal. 2001; 322(7298): 1357.
16. Yildirim, A., Akinci, F., Gozu, H., Sargin, H., Orbay, E., Sargin, M. Translation, cultural adaptation, cross-validation of the Turkish DM quality-of-life (DQOL) measure. QOLResearch. 2007; 16(5):873-879.
17. Leila Tavakkoli, and Azizallah Dehghan . Compare the QOL in Type 2 Diabetic Patients with Healthy Individuals (Application of WHOQOL-BREF). Zahedan J Res Med Sci. 2017 February; 19(2):e5882.
18. 18.Mustapha W, Hossain ZS, LoughlinKO .Management and Impact of DM on QOL among the Lebanese Community of Sydney: A Quantitative Study. J DM Metab.2014; 5:329.
19. Madhu K & Sridhar G. Coping with DM: A paradigm for coping with chronic illness. International Journal of DM in Developing Countries.2001; 21(2): 103-111.
20. 20.Bardage, Carola, and Dag GL Isacson. "Hypertension and health-related quality of life: an epidemiological study in Sweden." Journal of clinical epidemiology. 2001; 54(2): 172-181.
21. WHOQOL GROUP, et al. Development of the World Health Organization WHOQOL-BREF quality of life assessment. Psychological medicine. 1998; 28(3): 551-558.
22. Walker, Stuart R., and Rachel M. Rosser, eds. Quality of life assessment: key issues in the 1990s. First edition. London. Springer Science & Business Media. 2012; p:11-16.
23. World Health Organization. "Programme on mental health: WHOQOL user manual." (1998).

24. Eljedi, A., Mikolajczyk, R. T., Kraemer, A., & Laaser, U. Health-related QOL in diabetic patients and controls without DM in refugee camps in the Gaza strip: a cross-sectional study. BMC Public Health. 2006; 6(1); 268.
25. Zivcicova E, Gullerova M. QOL Comparison of People with and without DM Mellitus .CBU Int Conference Proc. 2015;3:258.
26. Ahari S, Arshi S, Iranparvar M, Amani F, Siahpoush H. The effect of DM on QOL in patients with type II DM. J Ardabil Univ Med Sci. 2010; 8(4):394–402.
27. Boon-How Chew, SherinaMohd-Sidik and SazlinaShariff-Ghazali . Negative effects of DM – related distress on health-related quality of life: an evaluation among the adult patients with type 2 DM mellitus in three primary healthcare clinics in Malaysia. Health and QOL Outcomes. 2015; 13:187.
28. Melchiors AC, Correr CJ, Pontarolo R, Santos Fde O, Souza Rape. QOL in hypertensive patients and concurrent validity of Minichal-Brazil. Arquivos brasileiros de cardiologia. 2010; 94(3): 357-364.
29. XianglongXu, YunshuangRao, Zumin Shi, Lingli Liu, Cheng Chen, and Yong Zhao. Hypertension Impact on Health-Related Quality of Life: A Cross-Sectional Survey among Middle-Aged Adults in Chongqing, China. International Journal of Hypertension. 2016; Volume 2016, Article ID 7404957, 7 pages.
30. Irvine MJ, Garner DM, Olmsted MP, Logan AG. Personality differences between hypertensive and normotensive individuals: influence of knowledge of hypertension status. Psychosom Med. 1989; 51(5):537-549.
31. Bloom JR, Monterossa S. Hypertension labeling and sense of well-being. Am J Public Health. 1981; 71(11):1228-1232.
32. Tamara Poljicanin, DeaAjdukovi , Mario s ekerija , MirjanaPibernik-Okanovic,zeljko Metelko ,GorkaVuleti ć Mavrinac. DM mellitus and hypertension have comparable adverse effects on health-related quality of life. BMC Public Health. 2010; 10:12.
33. Hwee-Lin Wee , Yin-Bun Cheung , Shu-Chuen Li , Kok-Yong Fong and Julian Thumboo. The impact of DM mellitus and other chronic medical conditions on health-related Quality of Life: Is the whole greater than the sum of its parts?. Health and QOL Outcomes. 2005; 3:2.
34. Otiniano ME, Du XL, Ottenbacher K, Markides KS.The effect of DM combined with stroke on disability, self-rated health, and mortality in older Mexican Americans: results from the Hispanic EPESE. Arch Phys Med Rehabil. 2003; 84:725-730.
35. Oldridge NB, Stump TE, Nothwehr FK, Clark DO. Prevalence and outcomes of comorbid metabolic and cardiovascular conditions in middle- and older-age adults. J Clin Epidemiol. 2001; 54:928-934.
36. International DM Federation: Prevalence estimates of DM mellitus in Western Pacific region. (http://www.idf.org/ e-atlas/home/index.cfm?node=104).
37. O'Brien JA, Patrick AR, Caro JJ. Cost of managing complications resulting from type 2 DM mellitus in Canada. BMC Health Serv Res. 2003; 3:7.
38. Wang SL, Head J, Stevens L, Fuller JH. Excess mortality and its relation to hypertension and proteinuria in diabetic patients. The World Health Organization multinational study of vascular disease in DM. DM Care. 1996; 19:305-312.
39. Skevington SM, Lotfy M, O'Connell KA. The World Health Organization's WHOQOL-BREF quality of life assessment: psychometric properties and results of the international field trial: a report from the WHOQOL group. Qual Life Res. 2004; 13 (2): 299-310.