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RESEARCH ARTICLE

QUALITY OF LIFE AMONG HYPERTENSIVE PATIENTS ATTENDING PRIMARY HEALTHCARE CENTERS IN JEDDAH, SAUDI ARABIA.

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Abstract

Background: Hypertension is frequent in Saudi Arabia and has significant impact on the quality of life (QOL).
Objective: To assess QOL and associated factors among hypertensive patients attending primary healthcare centers (PHC).
Methods: A cross-sectional study was carried out among adult hypertensive patients following in a PHC in Jeddah, Saudi Arabia.The WHOQOL-BREF questionnaire was used to assess physical, psychological, social and environmental health domains. Demographic, socioeconomic and clinical data were analyzed as predictors for poor QOL in univariate and stepwise multiple regression.
Results: A total 273 hypertensive patients were included; 52.7% males, 36.6% aged>50 years,mean±SD duration of hypertension=6.39±5.50 years, and 32.2% were diabetic. Per-domain QOL assessment showed mean±SD scores=61.30±16.79; 61.16±16.59; 56.94±22.04; and 55.45±16.35 in physical, psychological, social and environmental health domains, respectively. As per the domain, old age, low educational level, unemployment, low income, long disease duration, compliance to and frequent use of antihypertensive medications and coexistence of comorbidities were predictors for poor QOL.
Conclusion: Hypertensive patients have impaired QOL aggravated by several adverse demographic, socioeconomic and clinical factors.

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Introduction:-

Hypertension or systemic arterial hypertension is a condition in which the systolic blood pressure is chronically elevated.It is diagnosedat least after 2 readings of blood pressure at different times indicating a persistent elevation. At first presentation, hypertension is not a dramatic condition and often has an insidious onset(1). It may therefore remain unrecognized and undiagnosed for several years and manifest as an end organ damage(2). Hypertension is one of the leading contributors to morbidity and mortality,causing over 7.1 million deaths every year (3,4). In Saudi Arabia, 26.1% individuals aged 30 to 70 yearssuffer from hypertension(5), which is comparable with epidemiological data from other countries such as the US and China reporting 29% and 24.6% of prevalence, respectively (6). The global burden of hypertension is increasing and it has been projected that by the year 2025, 1.56 billion people will develop this condition(3).

Hypertension is a multi-factorial pathology and represents a major independent risk factor for cardiovascular and renal diseases leading to multiple organ damage(4). In addition to the medical sequelae, hypertension has been described to have far reaching psychological consequences that include anxiety to depression(7). Like all other chronic illnesses, hypertension alters the quality of life (QOL) of patients(8). Quality of life is the state of physical, emotional and social function of an individual in relation to underlying morbidity. It ishighly dependent on various socio-demographic factorsand is measured as perceived by the patient(6,9).

In the recent past, there have been reports of hypertension \associated with a low health related QOL.It is associated with negative impact on newly diagnosed patients as it is perceived asa life-long disease; which makes them psychologically fragile (3). In addition, the coexistence of unfavorable clinical and socioeconomic factors exacerbatethe impact of hypertensionon QOL, as it worsens the impairment of physical andsocial functionsandburdens emotional and mental impact of the disease (7,9,10).

This study sought to assessthe QOL among hypertensive patients attending primary healthcare centers, and the socio-demographic and clinical factors influencing variousQOL domains. This would help to identify aspects of management of hypertension that require improvement or that should be addressed in the target population.

Methods:-

A cross-sectional study was carried out between 10th to 25th October 2016 in Al Safa and Briman PHCs, Jeddah, Saudi Arabia. All hypertensive patients aged>20 years who presented in the PHC during the study period were asked to participate in the study. The objectives of the study were explained and consent was taken from the patients to participate in the study. The World Health Organization Quality of Life (WHOQOL)-BREF questionnaire was administered to the participants by trained investigators. This questionnaire is a brief version of the WHOQOL-100 questionnaire, which was developed by the WHOQOL group (11). It consists of a 26-item cross-cultural tool for QOL assessment, including the following 4 domains: 1) physical health (7 items); 2) psychological health (6 items); social relationships (3 items); and environment (8 items). Each item is a 5-scale Likert-type question assessing either satisfaction level (“very dissatisfied” to “very satisfied”), frequency (“never” to “always”) or amount (“not at all” to “an extreme amount”); and answers are scored 1 to 5.Demographic and socioeconomic data such as gender, age, occupation and educational level, etc. were collected, as well as clinical data such as duration of hypertension, compliance with treatment and other medical history. The study was approved by the Medical Research and Studies Department, Directorate of Health Affairs, Jeddah.

Sample size calculation:

Sample size was calculated to detect, with ±2-point precision, 95%CI, 0.80 statistical and 0.05 type I error, the following mean scores of the 4 QOL domains: physical health (score± SD=54.7±14.9; N=214); psychological health (49.4±12.7; N=155); social relationships (64.1±14.1; N=191); and environment (59.5±10.4; N=104). These scores were obtained using the WHOQOL-BREF questionnaire from a comparable study by Ha et al (12). Of the 4 calculated sample sizes, the largest one (N=214) was used as a target sample size for our study, assuming an 80% response rate; resulting in a final target sample size N=275.

Statistical Methods:

Data was analyzed using Statistical Package for Social Sciences version 21.0 for Windows (SPSS Inc., Chicago, IL, USA). Categorical variables are presented as frequency and percentage, while continuous variables are presented as mean ± standard deviation (SD). Means and standard deviations (SD) were calculated for each item score. Domain-

related QOL was assessed using 4-20 scoring system as described in the WHOQOL-BREF manual (11). Domains' Scores were correlated to demographic and clinical factors using independent t-test or OneWay Analysis of Variance (ANOVA), as appropriate. Factors with significant correlation were analyzed as predictors for different QOL domains using univariate and stepwise multiple linear regression;results are presented as odds-ratios (OR) [95%CI]. A p value of <0.05 was considered to reject the null hypothesis.

Results:-

Participants Characteristics

A total 275 hypertensive patients were recruited, of whom 2 were excluded for important missing data (N=273). Gender distribution showed 52.7% males; age distribution showed 33.0% aged 18-40 years, 30.4% aged 40-50 years, 19.4% aged 50-60 years and 17.2% aged >60 years. Majority of the participants were married (65.9%), employed (50.9%), with university+educational level (46.6%). Analysis of clinical data showed mean±SD disease duration=6.39±5.50 years, 92.9% on antihypertensive medications, in which 61.5% had poor to moderate compliance. Most frequent comorbidities were diabetes (32.2%), followed by articular disease (20.1%), and respiratory disease (14.7%). (Table 1)

Measurement properties of the WHOQOL-BREF:

Analysis of reliability of the WHOQOL-BREF among the study population showed good internal consistency with a Cronbach's alpha coefficient of 0.801 for all 26 items. Per-domain reliabilityshowed Cronbach's alpha coefficient ranging between 0.715 and 0.718;except for social relationships domain where it was0.223.

Quality of life assessment:

Item-related scores (mean±SD) are presented in detail in Table 2. Domain-related QOL was assessed using both 4-20 and 0-100 scoring systems; these showed the following mean±SD scores: physical health=14.00±2.68 (61.30±16.79); psychological health=13.93±2.66 (61.16±16.59); social relationships=13.11±3.54 (56.94±22.04); and environment=12.74±2.49 (55.45±16.35).

Factors correlated with QOL:

Per domain analysis of factorsassociated with QOL is presented in detail in Table 3. Regarding physical health, lower scores were observed among older age category(p=0.000), widowed (p=0.000), retired and housewives (p=0.000), illiterate (p=0.000), low income (p=0.013), and high comorbidity participants (p=0.000), as well as those who are rigorously compliant with antihypertensive treatment (p=0.000). Regarding psychological health, lower scores were observed in older (p=0.001), widowed and divorced (p=0.026), retired (p=0.001), illiterate and primary educational level (p=0.000), high comorbidity participants (p=0.001), and who were fairly compliant with antihypertensive treatment (p=0.000); conversely, higher scores were observed in young single, employed and highly educated participants, as well as those without other comorbidities and in those who were moderately compliant with hypertension treatment. Regarding social relationships domain, lower scores were observed in older (p=0.039), divorced (p=0.000) participants, and in those who were fairly compliant with hypertension treatment (p=0.025). Low environmental health-related QOL scores were observed among participants with rented accommodation (p=0.0001), widowed (p=0.015), unemployed (p=0.000), illiterates (p=0.000), low income (p=0.000) and non-Saudi participants (p=0.001). Sleep quality was analyzed as a factor for QOL and showed significant correlation with all QOL domains, where related scores increased significantly with self-rated sleep satisfaction. In regression analysis, disease duration was significantly adversely correlated with lower QOL in all 4 domains (Figure 1).

Predictors of QOL among hypertensive patients:

Predictive models for physical health showed that the number of comorbidities (0 versus 1 versus 2 or more; OR [95%CI]=0.26 [0.17, 0.38]; p=0.000), compliance with treatment (poor versus fair versus rigorous compliance; OR [95%CI]= 0.22 [0.13, 0.36]; p=0.000) and income (OR [95%CI]=1.34 [1.02, 1.77]; p=0.037) were significant predictors of impaired QOL in both univariate and stepwise multiple regression models for physical health. For psychological health, educational level (illiterate versus primary versus up to secondary versus university+; OR [95%CI]=1.65 [1.09, 2.50]; p=0.018) andnumber of comorbidities (OR [95%CI]=0.52 [0.33, 0.80]; p=0.004) were the significant predictors of related QOL score; while disease duration approximated statistical significance (OR [95%CI]=0.94 [0.88, 1.00]; p=0.069) in the multivariate model.Regarding social relationships, only number of anti-hypertensive medications were significant in both univariate and multivariate analysis (OR [95%CI]=0.52 [0.31, 0.86]; p=0.011). Regarding environment, QOL was predicted by rental accommodation (OR [95%CI]=0.40 [0.22,

0.70]; p=0.002), educational level (OR=2.09 [1.51, 2.89]; p=0.000) and income (OR=2.88 [2.19, 3.78]; p=0.000). Per-domain results of univariate and stepwise multiple regression analysis for all investigated predictors are presented in Table 4.

Discussion:-

This study assessed different QOL domains among hypertensive patients attending primary healthcare centerswho showed impaired QOL, which was more remarkable in social and environmental domains. Population distribution showed good representativeness of both genders and all social classes, while non-Saudi individuals and those with low educational level (illiterate and primary level) were more weakly represented. The most typical respondent was a married, employed and highly educated Saudi male aged below 50, living in his own propriety with an average-to-high income, and is followedfor at least one other disease.

The average ratings of overall QOL and health satisfaction were neutral to good (scores=3.42/5 and 3.04/5, respectively), indicating relative impaired QOL in hypertensive patients. Comparative studies demonstratedthe impact of hypertension on patients' QOL as compared to random population (13–16).

In our study, the highest average scores were observed in physical (61.30) and psychological (61.16) health domains; while the lowest score (55.45) was observed in environmental health domain. By comparison to these findings, Ha et al. who assessed QOL among Vietnamese hypertensive patients using the WHOQOL-BREF tool observed higher QOL scores in social relationships (64.1) and environmental health domains (59.5), and lower scores in psychological health domain (49.4)(12). In Brazil, Melchior et al. assessed QOL reported higher scores ranging from 59.9 to 61.9 for physical health, 61.9 to 67.9 for psychological health, 69.2 to 74.8 for social relationships and 59.0 to 62.3 for environmental health domain; without significant difference between the hypertension severity levels (17).

In contrast with other studies(12,14,18) that found female patients more prone to impaired QOL, we found no gender discrepancy in any of the 4 QOL domains. Concordantly, a Brazilian study by Melchiors et al. reported no difference between genders in the 4 QOL domains (17). Other significant demographic and socioeconomic factors included age category, marital status, professional status, educational level and income, with some inter-domain differences. Lowest QOL scores were observed in older age category (>60 years), especially in physical, psychological and social relationships domains; while high educational level and high income were associated with better QOL scores in physical and environmental health domains, in addition to psychological health for educational level. Furthermore, employed professional status showed the highest score in physical, psychological and environmental health domains. These observations are consistent with findings from a Lebanese study by Khalifeh et al., reporting negative relationship of QOL with age and positive relationship with educational level(14). Similarly, Vietnamese study showed that high education level and employed professional status were significantly associated with better QOL in the 4 domains; whilenormal-to-high economic status showed higher but not statistically significant scores than poor economic one (12). In Nigerian study, increased income was predictive for improved QOL (15).

Duration of hypertension was among significant clinical factors associated with QOL, and psychological health domain was the most significantly affected, as demonstrated by the adverse collinear relationship showing linear decrease in psychological health domain score with the increase of disease duration. This suggests thatpsychological impact of hypertension in a function of time and emphasizes the need for timelyscreeningof psychological disorders such as depression and anxiety, as theyare frequentlyassociated withhypertension (19–21), especially in patients with long disease evolution.Comparably, duration of hypertension did not have significant impact on psychological health in the study by Kalifeh et al. (14); whereas it impacted both physical and psychological health in the series by Ha et al. (12).

We demonstrated that the existence of comorbidities was associated with a significant reduction of QOL-related scores. Number of comorbidities more specifically affected physical and psychological health domains. Our finding are supported by several studies showing that the existence and number of comorbidities are associated with reduced health-related QOL indicators among hypertensive patients and that physical health domain was the most affected (14,16,22). The study from Brazil identified heart failure, arrhythmia, obesity and depression as having significant additional impact on QOL of hypertensive patients (17). Another study by Palharas et al. observed significant

correlation between QOL and clinical and echocardiographic symptoms of heart failure in hypertensive patients (23).

Sleep quality showed to be a significant factor for QOL. Depending on the domain, patients who were very satisfied with their sleep quality had up to 50% higher scores as compared to those who were very dissatisfied. Sleep quality has been demonstrated to be a significant factor of quality of life either in healthy people or among patients with different chronic diseases (24–26). It was even proposed to be used as a screening tool for the QOL assessment (27). However, in hypertensive patients, poor sleep quality may be the direct consequence of apneic-hypoapneic disorders; which are highly associated to the occurrence of hypertension and the diagnosis and treatment of which are crucial factors of therapeutic success and QOL improvement among hypertensive patients (28).

The number of antihypertensive medications and level of compliance were adversely correlated with the QOL. Study from Lebanon showed daily frequency of antihypertensive medication to be significant predictor for impaired QOL (14). In Nigerian study, authors observed a correlation between drug use and impaired psychological health domain, which impacted the overall QOL (15). Other authors reported low QOL scores in hypertensive patients who are adherent to pharmacologic medication (29). Several explanations could be given to these observations, whereas most probably the use of more than one antihypertensive therapy is related to disease severity and duration, which constitute the bridge between the number of medications and QOL (30).This has also been explained byunsatisfactory treatment outcome motivating medication dose escalation;which also increasesadverse drug effects. It has been shown that the existence and severity of these adverse effectsare associated with differential levels of impact on patients' QOL (31,32); and are more likely to be prevalent in patients who are compliant to pharmacotherapy (1,4). Thesemedication-related issues not only impact physical and social health but also cause a plethora of emotion, with dissatisfaction and possible depression (7).

These observations highlight the importance of patient's education regarding treatments' adverse effects and emphasize systemic assessment by physicianof benefit/risk equationfor each prescribed treatment. On the other hand, appropriate management including pharmacotherapy and lifestyle changes improves QOL, in addition to improving blood pressure control.

Although investigatedfactors were significantly associated with QOL, other plausible factors were not assessed in this study; such asthe adequate control of blood pressure, which has been demonstrated to be highly associated with QOL (33). In addition, it constitutes a crucial issue as only up to 16.1% of hypertensive patients are reported to be adequately controlled (6). Similarly, regular exerciseshould be recommended to hypertensive patients as it was demonstrated to have positive impact on controlling hypertension and improving health-related QOL especially among those with moderate hypertension (14,29,34).

Because hypertension is a non-curable disease,afflictedindividuals should benefit from lifelong management including simultaneous lifestyle modifications and pharmacotherapy in addition to close monitoring of therapeutic outcome and adverse events, all being crucial factors for improving their QOL.

Conclusion:-

Hypertensive patients have impaired health-related QOL indicators, which interests all physical, psychological, social and environmental healthdomains. Old age, unemployment, low education, and low economic class are most significant adverse demographic and socioeconomic factors forQOL; whileadverse clinical factors includelong disease duration, existence of comorbidities and greater use of antihypertensive medications.

The association and interaction between various aspects of hypertension and its management and patients' demographic, socioeconomic and clinical factors further display the complexity of assessing the health-related QOL. Appropriate management of hypertensive patients should includea comprehensive assessment of all these aspects to implement targeted lifestyle modifications in association with pharmacotherapy; along with close monitoring of therapeutic outcome and adverse effects, all being crucial factors for improving patients' QOL.

Table 1: demographic, socioeconomic and clinical characteristics of the study population

Parameter	Value /category	Number of participants	Percentage
Gender	Male	139	52.7
	Female	125	47.3
Age (years)	18-40	90	33.0
	40-50	83	30.4
	50-60	53	19.4
	>60	47	17.2
Accommodation	Proprietary	163	61.7
	Rental	101	38.3
Marital status	Single	34	12.6
	Married	178	65.9
	Divorced	24	8.9
	Widowed	34	12.6
Number of children	Mean (SD), range 0-25	4.37	3.86
Occupational status	Housewife	68	35.1
	Unemployed	16	5.9
	Employed	138	50.9
	Retired	49	18.1
Educational level	Illiterate	17	6.4
	Primary	25	9.5
	Up to secondary	99	37.5
	University +	123	46.6
Income (SAR)	<5,000	62	23.3
	5,000 – 10,000	79	29.7
	10,000 – 15,000	80	30.1
	>15,000	45	16.9
Nationality	Saudi	225	86.5
	Non Saudi	35	13.5
Duration of HTN	Mean (SD), range=1-30 years	6.39	5.50
Number of anti-HTN medications	0	19	7.1
	1	123	45.9
	2	82	30.6
	3	43	16.0
	4	0	0.0
	5	1	0.4
Compliance with treatment	Moderately	163	61.5
	Fairly	86	32.5
	Rigorously	16	6.0
Frequency of visits	Mean(SD), range = 0 to 25, per year	3.79	2.86
On diet	For HTN	126	46.2
	For other disease	67	24.5
Other medical history	Diabetes	88	32.2
	Heart disease	33	12.1
	Respiratory disease	40	14.7
	Articular disease	55	20.1
	Other 1	31	11.4
	Other 2	4	1.5
	Other 3	2	0.7
Number of comorbidities	None	106	38.8
	One	108	39.6
	2 or more	59	21.6

SD: Standard deviation; HTN: hypertension; SAR: Saudi Riyal. Note: because of missing data, total number of the participants does not sum up to 273 for all variables.

Table 2: Average scores of different quality of life items

	Item	Score	
		Mean	**SD**
Q1	Rating overall quality of life (1=very poor, 5=very good)	3.42	0.85
Q2	Satisfaction about health (1= very dissatisfied, 5 = very satisfied)	3.04	0.89
Amount (1= not at all, 5=an extreme amount)			
Q3	Activity prevented by physical pain §	2.12	1.05
Q4	Need for medicament to function §	2.19	1.38
Q5	Enjoying life	3.26	0.91
Q6	Feeling own life is meaningful	3.52	0.96
Q7	Ability to concentrate	3.43	0.93
Q8	Feeling safe	3.70	1.04
Q9	Healthiness of physical environment	2.68	0.93
Q10	Amount of energy for daily activity	3.34	0.97
Q11	Acceptance of bodily appearance	3.34	1.29
Q12	Having enough money	3.24	1.22
Q13	Availability of important information	3.22	0.94
Q14	Leisure opportunity	2.64	1.09
Q15	Ability to get around	3.46	1.03
Satisfaction (1= very dissatisfied, 5 = very satisfied)			
Q16	Sleep satisfaction	3.28	1.05
Q17	Daily activity satisfaction	3.49	0.93
Q18	Work capacity satisfaction	3.24	1.23
Q19	Self-satisfaction	3.33	0.91
Q20	Relationships satisfaction	3.63	1.03
Q21	Sexual life satisfaction	3.15	1.39
Q22	Fiends support satisfaction	3.39	1.03
Q23	Living place satisfaction	3.64	1.14
Q24	Health access satisfaction	2.76	1.06
Q25	Transportation satisfaction	3.61	1.15
Frequency			
Q26	Negative feelings § (1=never, 5= always)	1.99	1.16
Overall self-rated QoL score (0 = extremely bad; 100 = extremely good quality of life)		66.33	17.90
Domain-related QoL scores (4=very poor, 20=very good QoL)			
Physical Health [min=4, max=20]		14.00	2.68
Psychological Health [min=4, max=20]		13.93	2.66
Social Relationships [min=4, max=20]		13.11	3.54
Environment [min=4, max=18.5]		12.74	2.49
Domain-related QoL scores (0=very poor, 100=very good QoL)			
Physical Health [min=0, max=100]		61.30	16.79
Psychological Health [min=0, max=100]		61.16	16.59
Social Relationships [min=0, max=100]		56.94	22.04
Environment [min=0, max=9…]		55.45	16.35

SD: Standard deviation; QOL: quality of life; § the lower the score, the better the related QOL.

Table 3: Factors correlated with quality of life (Categorical variables; independent t-test, OneWay ANOVA)

Factors		**Physical health**			**Psychological health**			**Social relationships**			**Environment**		
Categorical variable/category		**Mean**	**SD**	**p-value**	**Mean**	**SD**	**p-value**	**Mean**	**SD**	**p-value**	**Mean**	**SD**	**p-value**
Gender	Male	14.27	2.5	.067	13.90	2.6	.888	12.98	3.5	.550	12.81	2.3	.643
	Female	13.66	2.8		13.95	2.7		13.24	3.5		12.67	2.6	
Age category (years)	18-40	14.49	2.7	.000**	14.10	2.7	.001*	13.93	3.6	.039*	12.64	2.6	.163
	40-50	14.53	2.1		14.49	2.3		12.72	3.4		13.17	2.3	
	50-60	14.06	2.5		14.03	2.4		13.04	3.3		12.73	2.3	
	>60	12.08	2.6		12.52	2.7		12.30	3.6		12.17	2.4	
Accommodation	Propriety	13.81	2.6	.099	13.93	2.5	.865	13.08	3.5	.869	13.17	2.2	.0001**
	Rental	14.37	2.7		13.99	2.8		13.15	3.4		11.99	2.6	
Marital Status	Single	15.18	2.1	.000**	14.65	3.1	.026*	12.81	4.1	.000**	12.66	2.8	.015*
	Married	14.14	2.5		14.07	2.4		13.65	2.9		13.06	2.1	
	Divorced	13.54	2.7		13.08	2.8		10.52	3.9		12.10	2.8	
	Widowed	12.32	3.1		13.05	2.9		12.29	4.7		11.73	3.1	
Occupation	Housewife	13.40	3.1	.000**	13.84	2.4	.001*	13.26	3.4	.271	12.36	2.4	.000**
	Unemployed	13.98	2.2		13.54	3.3		14.67	3.9		10.60	3.2	
	Employed	14.71	2.1		14.46	2.4		12.96	3.5		13.24	2.3	
	Retired	12.79	2.9		12.76	3.0		12.69	3.4		12.54	2.3	
Educational level	Illiterate	11.64	3.3	.000**	12.69	3.2	.000**	12.71	4.6	.522	10.76	3.5	.000**
	Primary	12.94	2.6		12.53	2.4		12.92	3.2		10.91	1.8	
	Up to secondary	14.27	2.5		13.69	2.4		12.78	2.0		12.48	2.3	
	University +	14.35	2.5		14.56	2.6		13.46	3.8		13.54	2.2	
Income (SAR)	<5,000	13.51	2.5	.013*	13.52	2.5	.174	13.02	4.0	.950	10.93	2.6	.000**
	5,000 – 10,000	14.54	2.7		13.73	2.6		13.00	3.0		12.46	1.8	

	10,000 – 15,000	13.95	2.7		14.13	2.5		13.30	3.5		13.11	1.9	
	>15,000	14.47	2.3		14.56	2.7		13.16	3.7		15.10	1.9	
Nationality	Saudi	13.93	2.7	.988	13.95	2.6	.685	13.23	3.5	.323	12.93	2.2	.001*
	Non-Saudi	13.92	2.2		13.75	3.2		12.56	3.9		11.37	3.5	
Comorbidity	None	15.43	2.0	.000** [1]	14.43	2.5	.001* [2]	13.56	3.2	.154	12.94	2.4	.207
	One	13.62	2.3		14.03	2.3		12.62	3.3		12.81	2.2	
	2 or more	12.15	2.8		12.85	3.1		13.17	4.2		12.24	2.5	
Compliance with HTN treatment	Moderately	15.03	2.0	.000**	14.48	2.3	.000**	13.54	3.3	.025*	13.09	2.3	.012*
	Fairly	12.61	2.5		13.01	2.8		12.27	3.9		12.25	2.6	
	Rigorously	10.96	3.0		13.87	3.2		12.63	3.2		11.79	2.8	
Sleep satisfaction	Very dissatisfied	10.32	3.2	.000**	11.39	5.1	.000**	10.67	5.0	.005*	11.10	3.9	.005*
	Dissatisfied	11.76	2.4		12.84	2.7		12.27	3.5		12.49	2.8	
	Neutral	13.71	1.8		13.65	2.2		13.14	3.1		12.33	2.1	
	Satisfied	15.34	2.5		14.68	1.8		13.51	3.1		13.18	2.1	
	Very satisfied	15.84	2.6		15.28	2.7		14.40	4.2		13.46	2.6	
Continuous variable		**B**		**p-value**	**B**		**p-value**	**B**		**p-value**	**B**		**p-value**
Number of children		-0.177		.000**	-0.120		.005*	-0.122		.031*	-0.045		.264
Disease duration (years)		-0.130		.000**	-0.121		.000**	-0.085		.030*	-0.077		.005*
No. of anti-HTN treatments		-0.975		.000**	-0.404		.029*	-0.651		.009*	-0.149		.388
Number of comorbidities		-1.286		.000**	-0.614		.000**	-0.155		.471	-0.283		.060
Number of visits per year		-0.210		.000**	0.065		.256	0.059		.444	0.050		.341

SD: Standard deviation; * p<0.05; ** p<0.001; [1] none>one>2 or more; [2] none = one > 2 or more; B: regression non-standardized coefficient.

Figure 1: Correlation between disease duration and different quality of life domains scores

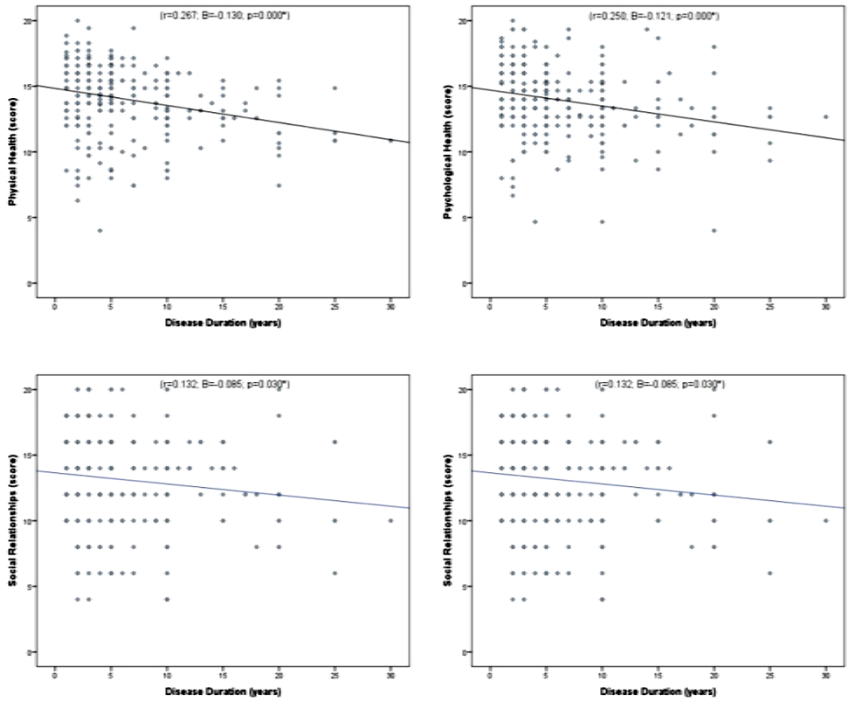

Figure 1: Duration of hypertension is associated with linear decrease in all 4 quality of life domains, including physical health (r=0.267, B=-0.130; p=0.000*); psychological health (r=0.250, B=-0.121; p=0.000); social relationships (r=0.132, B=-0.085; p=0.030) and environment (r=0.171, B=-0.077; p=0.005).

Table 4: Predictors of quality of life among hypertensive patients

Domain / Predictor	**Univariate model**				**Stepwise multiple regression model**			
	OR	95%CI		p-value	OR	95%CI		p-value
Physical health								
Age category	0.50	0.38	0.66	.000*	N.E	N.E	N.E	N.E
Marital status	0.40	0.28	0.59	.000*	N.E	N.E	N.E	N.E
Occupation	1.08	0.79	0.68	.634	N.E	N.E	N.E	N.E
Educational level	2.11	1.47	3.04	.000*	N.E	N.E	N.E	N.E
Income	1.37	1.001	1.88	.049*	1.34	1.02	1.77	.037*
Comorbidity	0.19	0.13	0.28	.000*	0.26	0.17	0.38	.000*
No. anti-HTN treatment	0.38	0.26	0.54	.000*	N.E	N.E	N.E	N.E
Compliance with anti-HTN	0.11	0.07	0.17	.000*	0.22	0.13	0.36	.000*
Number of children	0.84	0.77	0.91	.000*	N.E	N.E	N.E	N.E
Disease duration	0.88	0.83	0.93	.000*	N.E	N.E	N.E	N.E
Number of visits per year	0.81	0.73	0.91	.000*	N.E	N.E	N.E	N.E
Psychological health								
Age category	0.64	0.48	0.86	.003*	N.E	N.E	N.E	N.E
Marital status	0.56	0.38	0.82	.003*	N.E	N.E	N.E	N.E
Occupation	0.88	0.65	1.20	.415	N.E	N.E	N.E	N.E
Educational level	2.17	1.51	3.12	.000*	1.65	1.09	2.50	.018*
Income	1.42	1.04	1.93	.027*	N.E	N.E	N.E	N.E
Comorbidity	0.47	0.32	0.72	.000*	0.52	0.33	0.80	.004*
No. anti-HTN treatment	0.67	0.47	0.96	.029*	N.E	N.E	N.E	N.E
Compliance with treatment	0.42	0.25	0.70	.001*	N.E	N.E	N.E	N.E
Number of children	0.89	0.82	0.96	.005*	N.E	N.E	N.E	N.E

Disease duration	0.89	0.84	0.94	.000*	0.94	0.88	1.00	.069
Social relationships								
Age category	0.62	0.42	0.91	.015*	N.E	N.E	N.E	N.E
Marital status	0.55	0.33	0.93	.026*	N.E	N.E	N.E	N.E
No. anti-HTN treatment	0.52	0.32	0.85	.009*	0.52	0.31	0.86	.011*
Compliance with treatment	0.43	0.21	0.87	.019*	N.E	N.E	N.E	N.E
Number of children	0.89	0.79	0.99	.031*	N.E	N.E	N.E	N.E
Disease duration	0.92	0.85	0.99	.030*	N.E	N.E	N.E	N.E
Environment								
Marital status	0.63	0.44	0.91	.013*	N.E	N.E	N.E	N.E
Accommodation	0.31	0.17	0.56	.000*	0.40	0.22	0.70	.002*
Occupation	1.29	0.97	1.71	.078	N.E	N.E	N.E	N.E
Educational level	2.90	2.09	4.01	.000*	2.09	1.51	2.89	.000*
Income	3.57	2.78	4.58	.000*	2.88	2.19	3.78	.000*
Nationality	0.21	0.09	0.50	.001*	N.E	N.E	N.E	N.E
Compliance with treatment	0.47	0.29	0.78	.003*	N.E	N.E	N.E	N.E
Disease duration	0.93	0.88	0.98	.005*	N.E	N.E	N.E	N.E

* Significant ($p<0.05$);N.E: Not included in model because not significant; OR: odds-ratio; CI: confidence interval.

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