Available online at **www.ijmrhs.com**

ISSN No: 2319-5886

International Journal of Medical Research & Health Sciences, 2019, 8(5): 96-102

Assessment of the Quality of Life among Diagnosed Hypertensive Patients Attending Primary Health Centers in Majmaah, Saudi Arabia

Syed Meraj Ahmed*, Raed Jarallah Almuqhim, Hammam Fahad Alkanhal and Ahmed Ammar Alalem

Department of Community Medicine, College of Medicine, Majmaah University, Majmaah, Saudi Arabia

**Corresponding e-mail: merajahmed10@hotmail.com*

ABSTRACT

Introduction: *Very few studies have been successful in assessing the health-related quality of life among diagnosed hypertensive patients attending clinics or hospitals for follow-ups. Since the Ministry of Health, Saudi Arabia has dedicated a separate webpage to tackle this problem; feedback through community-based studies is needed to ensure proper planning and implementation.* ***Methodology:*** *A community based cross-sectional study was done to find out the correlation between the quality of life and hypertensive patients undergoing treatment in Majmaah, Saudi Arabia.* ***Results:*** *A total of 184 participants with a mean age of 57.8 years completed this study. Female participants (26.8%) overwhelmingly rated their quality of life as excellent as compared to male participants (4.9%) even though an equal number of both participants (20.2%) considered it to be good.* ***Conclusion:*** *A longitudinal study is needed to find out this significant difference in the symptomatology of Saudi male and female hypertensive patients on long term medication.*

Keywords: Quality of life, Hypertension, Clinical symptoms, Antihypertensive medication, Saudi Arabia

INTRODUCTION

WHO has defined Quality of life (QoL) 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" [1]. There have been a number of studies on quality of life among hypertensive patients and findings have consistently shown that it is lower than those among normotensive people [2,3]. Primarily, studies worldwide have focused on levels of depression, anxiety and other mental health issues associated with the development and progress of cardiovascular diseases including hypertension. Thrall, et al., found that levels of depression and anxiety were higher among patients with atrial fibrillation even 6-months after diagnosis and treatment [4]. Another study found that people who were aware of being hypertensive were more depressed while those taking antihypertensive had a poor health status [5]. Mena-Martin, et al., similarly found that diagnosed and treated hypertensive patients had a poorer health-related quality of life as compared to non-treated ones [6]. Tamara, et al., discovered in their study that if diabetes is also present along with hypertension then it further impairs the quality of life among the patients [7]. There is a definitive association of reduced/impaired quality of life among the patients of hypertension. Ritu, et al., in their study found that the physical domain of the quality of life was most affected in hypertensive patients [8]. Korhonen, et al., in their in-depth study found that quality of life was affected either by or a combination of awareness of hypertension, drug side effects, newly diagnosed diabetes or obesity but not due to high blood pressure [9]. Another similar study in Spain found that awareness of hypertension among females led to the lowering of the health-related quality of life [10].

Studies done earlier shows that the incidence and prevalence of chronic diseases like diabetes and hypertension are increasing in the middle-eastern region particularly the Arab and other Gulf countries [11]. A number of studies have also shown that even though the life expectancy is higher among the Saudi population yet they are not living healthily, with others finding that those years lived with disability leads to increasing healthcare expenditure and low quality of life [12,13]. A study in Saudi Arabia found that only 45% of the total participants on medication for hypertension had their blood pressure under control [14]. This means that even with medication their quality of life was compromised. Similar studies assessing the relationship between quality of life and hypertension found that scores for physical

capacity, mental health psychological functioning, vitality, and social functioning were lower than among normal people [15,16].

Surprisingly very few studies are available on this topic in Saudi Arabia even though it has a very high population affected with chronic illnesses and particularly cardiovascular diseases like hypertension. Taking this into consideration it was felt that a study on quality of life assessment among hypertensive patients should be done in Majmaah, Saudi Arabia.

Objectives

General objective: Assessment of the quality of life among diagnosed hypertensive patients attending primary health centers in Majmaah, Saudi Arabia.

Specific objectives: To determine the attitude of hypertensive patients towards the treatment, to assess the quality of life of patients being treated for hypertension, and to study the prevalence of clinical symptoms among hypertensive patients undergoing treatment.

MATERIALS AND METHODS

Study Design

This is a cross-sectional, observational study conducted in the primary health centers in the Majmaah area. Majmaah is the capital city of the Sudair area in Saudi Arabia. The patients were diagnosed with hypertension who were attending the primary health centers (Almatar), (Alyarmok), (Alfaiha), and (Alfaisaliah) in Majmaah, Saudi Arabia were taken for this study.

A complete enumeration of patients visiting the primary health centers during the study period of 4-months was done. Selection criteria were based on patients more than 21 years of age of either gender, diagnosed with hypertension and undergoing treatment for a minimum of the past 6-months were included in the study. The patients were approached by their physician who explained the objective of the study and its benefit to the society. On agreeing to participate, the patients were asked to give written consent for the study. Any patients with complications associated with hypertension, severely morbid, pregnant and nursing mothers, associated mental illness and those who refused consent were excluded from the study. Ethical approval was obtained from the Deanship of Scientific Research, Majmaah University. Since the level of correlation between the unhealthy quality of life and hypertension was not available for the Riyadh region, an approximate of 20% expected correlation was used. A 95% confidence interval and 5% precision were used to calculate the sample size which came to 245. Considering a 20% attrition the final sample size was 196 participants. An interview-based, close-ended questionnaire partially based on EuroQoL EQ-5D17 was used to collect data from the patients. It was administered in the presence of a field investigator to address any queries the participants would have while filling it up. Any patient who declined to fill any questions or complete the form was not included in the study.

All the data were entered electronically into the statistical software SPSS version 24.0 for analysis. Based on the contingency table, a non-parametric test of independence (Chi-square test) was used to assess the association between categorical variables.

Ethical approval was obtained from the Deanship of Scientific Research, Majmaah University

RESULTS

In this study, a total of 184 patients with a mean age group of 57.8 years participated in the final tally. Most of the participants (42.39%) belonged to the age group of 51-60 years. Lowest representation (3.26%) was from the age group for less than 40 years. The representation of female participants (57.07%) was more than the male participants (42.93%). This could be because females being housewives had more time to visit the healthcare center to follow up where the interview for this study was conducted.

Table 1 shows the response of the participants when asked about the diagnosis of hypertension and their attitude towards its treatment and follow up. Significantly a greater percentage of males (25.5%) than females (20.7%) were diagnosed of hypertension during a routine visit to the doctor while on the other hand, the percentage of females (17.4%) were more than males (14.1%) during admission in the casualty ($p<0.000$). Most of the participants (96.2%) said that they were regularly taking their medications after being diagnosed with hypertension and there was no

significant difference in the response between both the genders. For visiting the doctor on a monthly basis, the majority of the participants (85.2%) answered in the affirmative. Both the males (25.5%) and females (34.2%) responded negatively when asked about taking self-measurement of blood pressure at home for monitoring purpose.

Table 1 Distribution of hypertensive population according to their attitude towards diagnosis and treatment

Variables		Gender		Total	p-value
		Male	Female		
Diagnosis of hypertension	By regular visit doctor	47 (25.5%)	38 (20.7%)	85 (46.2%)	X^2=21.59 p=0.000
	By emergency	26 (14.1%)	32 (17.4%)	58 (31.5%)	
	Others	6 (3.3%)	17 (9.2%)	23 (12.5%)	
	Not able to recollect	0 (0.0%)	18 (9.8%)	18 (9.8%)	
Total		79 (42.9%)	105 (57.1%)	184 (100%)	
Taking regular medications	Yes	74 (40.2%)	103 (56.0%)	177 (96.2%)	X^2=2.8 p=0.247
	No	4 (2.2%)	2 (1.1%)	6 (3.3%)	
	No response	1 (0.5%)	0 (0.0%)	1 (0.5%)	
Total		79 (42.9%)	105 (57.1%)	184 (100.0%)	
Visit to the doctor for regular check-up	Monthly	66 (36.3%)	89 (48.9%)	155 (85.2%)	X^2=3.77 p=0.287
	Every 3 months	6 (3.3%)	13 (7.1%)	19 (10.4%)	
	Every 6 months	3 (1.6%)	3 (1.6%)	6 (3.3%)	
	Once a year	2 (1.1%)	0 (0.0%)	2 (1.1%)	
Total		77 (42.3%)	105 (57.7%)	182 (100.0%)	
Self-measurement of blood pressure	Yes	30 (16.3%)	42 (22.8%)	72 (39.1%)	X^2=2.71 p=0.258
	No	47 (25.5%)	63 (34.2%)	110 (59.8%)	
	No response	2 (1.1%)	0 (0.0%)	2 (1.1%)	
Total		79 (42.9%)	105 (57.1%)	184 (100.0%)	

Table 2 shows the association of the factors with the quality of life of the participants suffering from hypertension. Significantly (p<0.000) more female participants (34.2%) said that they experienced a normal enjoyable life than males (14.7%). Similarly, when asked about their ability to concentrate on daily activities, a greater number of females (23.4%) than males (14.7%) rated it as excellent (p=0.005). Again, the number of female participants (17.9%) agreeing to a regular sleep routine habit was significantly greater than the males (12.0%) (p=0.015). When asked about their capacity for daily routine work because of the illness, there was not much difference in the positive response of both the males and females. Almost 50% of females responded positively to feeling healthy and fit compared to only 26.3% males which were not statistically significant. Overall, a significantly greater number of females (26.8%) said that their quality of life on a daily basis was excellent as compared to only 4.9% of males (p<0.001).

Table 2 Association of quality of life with multifactorial socio-clinical covariates

Variables details	Gender	Quality of life				Total	p-value
		Poor	Neutral	Good	Excellent		
Experience a normal enjoyable life	Males	10 (5.4%)	13 (7.1%)	29 (15.8%)	27 (14.7%)	79 (42.9%)	X^2=21.7, p<0.001
	Females	1 (0.5%)	6 (3.3%)	35 (19.0%)	63 (34.2%)	105 (57.1%)	
Ability to concentrate on daily activities	Males	8 (4.3%)	19 (10.3%)	25 (13.6%)	27 (14.7%)	79 (42.9%)	X^2=12.7, p=0.005
	Females	2 (1.1%)	12 (6.5%)	48 (26.1%)	43 (23.4%)	105 (57.1%)	
Daily sleep routine	Males	5 (2.7%)	30 (16.3%)	22 (12.0%)	22 (12.0%)	79 (42.9%)	X^2=9.98, p=0.015
	Females	0 (0.0%)	30 (16.3%)	42 (22.8%)	33 (17.9%)	105 (57.0%)	
Capacity for daily routine work	Males	9 (4.9%)	18 (9.8%)	25 (13.6%)	27 (14.7%)	79 (42.9%)	X^2=2.79, p=0.425
	Females	12 (6.5%)	25 (13.6%)	43 (23.4%)	25 (13.6%)	105 (57.1%)	
Able to feel healthy and fit	Males	6 (3.3%)	24 (13.0%)	30 (16.3%)	19 (10.3%)	79 (42.9%)	X^2=4.97, p=0.174
	Females	4 (2.2%)	21 (11.4%)	54 (29.3%)	26 (14.1%)	105 (57.1%)	
Quality of life on a daily basis	Males	5 (2.7%)	27 (14.8%)	37 (20.2%)	9 (4.9%)	78 (42.6%)	X^2=28.69, p<0.001
	Females	1 (0.5%)	18 (9.8%)	37 (20.2%)	49 (26.8%)	105 (57.4%)	

Table 3 lists all the responses given for the persistent clinical symptoms that might be experienced by the hypertensive patients on a daily basis. It displays only the positive responses given by the participants and shows the distribution according to classification by age group. Most of the males in the >65 years age group (16.5%) complained of blurred vision compared to females (13.5%) who were in the 55-64 years age group. Chest pain (specific and non-specific) were reported on a daily basis by younger females (3.8%) as compared to males (7.6%) who were much older in age. When asked about any symptoms of fainting episodes on a daily basis, significantly a greater number of males in the >65 years age group (20.3%) gave positive feedback than females. Again, it can be seen that frequency of headaches on a daily basis was felt more by males (30.4%) in the >65 years age group than females in the same age group (7.7%). Symptoms of palpitations occurred again more among males in the >65 years age group (10.1%) as compared to females (1.9%). Overall most of the symptoms appeared more common among males in all age groups than females.

Table 3 Distribution of persistent clinical symptoms on a daily frequency

Variables details	Gender	Age group in years (positive responses)				Total	p-value
		35-44	45-54	55-64	>65		
Blurred vision	Male	1 (1.3%)	8 (10.1)	4 (5.1%)	13 (16.5%)	26 (32.9%)	0.625
	Female	2 (19.5)	5 (4.8%)	14 (13.5%)	6 (5.8%)	27 (26.0%)	0.292
Chest pain	Male	0 (0.0%)	1 (1.3%)	1 (1.3%)	6 (7.6%)	8 (10.1%)	0.427
	Female	0 (0.0%)	4 (3.8%)	3 (2.9%)	3 (2.9%)	10 (9.6%)	0.388
Fainting episodes	Male	1 (1.3%)	2 (2.5%)	3 (3.8%)	16 (20.3%)	22 (27.8%)	0.024
	Female	2 (1.9%)	10 (9.6%)	16 (15.4%)	3 (2.9%)	31 (29.8%)	0.754
Headache	Male	1 (1.3%)	13 (16.5%)	10 (12.7%)	24 (30.4%)	48 (60.8%)	0.263
	Female	4 (3.8%)	19 (18.3%)	16 (15.4%)	8 (7.7%)	47 (45.2%)	0.214
Palpitation	Male	1 (1.3%)	6 (7.6%)	2 (2.5%)	8 (10.1%)	17 (21.5%)	0.668
	Female	1 (1.0%)	3 (2.9%)	3 (2.9%)	2 (1.9%)	9 (8.7%)	0.828

Table 4 shows the association of chronic illnesses with the quality of life. A concomitant presence of diabetes mellitus along with hypertension shows that females (29.5%) had a much better quality of life compared to males (28.6%) but it was not statistically significant. Those participants having chronic respiratory illness along with hypertension were asked about their quality of life and only 2.5% males and 5.8% females said that it was good to excellent. Participants with dyslipidemia were asked about their quality of life and significantly more males (27.8%) responded favorably than females (16.2%). This observation was statistically significant (p=0.026)

Table 4 Distribution of associated chronic illnesses/disorders with the quality of life

Variables			Diabetes Mellitus			Total
			Yes	No	No response	
Quality of Life	Poor	Males	3 (3.8%)	2 (2.5%)	0 (0.0%)	5 (6.3%)
		Females	0 (0.0%)	1 (1.0%)	0 (0.0%)	1 (1.0%)
	Neutral	Males	18 (22.8%)	9 (11.4%)	1 (1.3%)	28 (35.4%)
		Females	7 (6.7%)	11 (10.5%)	0 (0.0%)	18 (17.1%)
	Good	Males	21 (26.6%)	15 (19.0%)	1 (1.3%)	37 (46.8%)
		Females	10 (9.5%)	27 (25.7%)	0 (0.0%)	37 (35.2%)
	Excellent	Males	2 (2.5%)	7 (8.9%)	0 (0.0%)	9 (11.4%)
		Females	21 (20.0%)	28 (26.7%)	0 (0.0%)	49 (46.7%)
Total		Males	44 (55.7%)	33 (41.8%)	2 (2.5%)	79 (100.0%)
		Females	38 (36.2%)	67 (63.8%)	0 (0.0%)	105 (100.0%)
			Dyslipidaemia			Total
			Yes	No	No response	
	Poor	Males	3 (3.8%)	2 (2.5%)	0 (0.0%)	5 (6.3%)
		Females	0 (0.0%)	1 (1.0%)	0 (0.0%)	1 (1.0%)
	Neutral	Males	12 (15.2%)	15 (19.0%)	1 (1.3%)	28 (35.4%)
		Females	7 (6.7%)	11 (10.5%)	0 (0.0%)	18 (17.1%)

Quality of Life	Good	Males	20 (25.3%)	16 (20.3%)	1 (1.3%)	37 (46.8%)
		Females	12 (11.4%)	25 (23.8%)	0 (0.0%)	37 (35.2%)
	Excellent	Males	2 (2.5%)	7 (8.9%)	0 (0.0%)	9 (11.4%)
		Females	5 (4.8%)	44 (41.9%)	0 (0.0%)	49 (46.7%)
Total		Males	37 (46.8%)	40 (50.6%)	2 (2.5%)	79 (100.0%)
		Females	24 (22.9%)	81 (77.1%)	0 (0.0%)	105 (100.0%)
			Chronic Respiratory Illnesses			**Total**
			Yes	**No**	**No response**	
Quality of Life	Poor	Males	0 (0.0%)	5 (6.3%)	0 (0.0%)	5 (6.3%)
		Females	0 (0.0%)	1 (1.0%)	0 (0.0%)	1 (1.0%)
	Neutral	Males	3 (3.8%)	24 (30.4%)	1 (1.3%)	28 (35.4%)
		Females	5 (4.8%)	13 (12.4%)	0 (0.0%)	18 (17.1%)
	Good	Males	2 (2.5%)	34 (43.0%)	1 (1.3%)	37 (46.8%)
		Females	3 (2.9%)	34 (32.4%)	0 (0.0%)	37 (35.2%)
	Excellent	Males	0 (0.0%)	9 (11.4%)	0 (0.0%)	9 (11.4%)
		Females	3 (2.9%)	46 (43.8%)	0 (0.0%)	49 (46.7%)
Total		Males	5 (6.3%)	72 (91.1%)	2 (2.5%)	79 (100.0%)
		Females	11 (10.5%)	94 (89.5%)	0 (0.0%)	105 (100.0%)

DISCUSSION

In this study, we found that a greater number of female patients (34.2%) than male patients (14.7%) experienced a normal enjoyable life which was statistically significant (χ^2=21.7, p<0.001). In contrast, a recent meta-analysis and systematic review study found that the health-related quality of life among hypertensive patients was lower than the normal population [17,18]. Female patients (23.4%) also fared better than their male counterparts (14.7%) in their ability to concentrate on day to day activities (χ^2=12.7, p=0.005). Female patients also had a better quality of sleep (7-8 hours) than male patients (χ^2=9.98, p=0.015). A study on sleep duration found that most of the participants with hypertension had difficulty in sleeping for more than 6 hours on an average [19]. Overall, a significant majority of female participants responded that their quality of life is excellent as compared to males (χ^2=28.69, p<0.001). This is in contrast to a study done in Saudi Arabia which showed that quality of life decreases in those suffering from chronic diseases like hypertension and diabetes [20].

This study showed that the capacity for daily routine work among hypertensive was poor among 6.5% female respondents as compared to male respondents (4.9%). But a greater number of males (3.3%) felt that they were not healthy and fit as compared to females (2.2%). Overall, a large number of females (26.8%) agreed to have an excellent quality of life on a daily basis which was significantly more (p<0.001) than the males (4.9%). Similar studies have shown the ability to feel fit or do routine work to be lower among the hypertensive population [21-23].

Very few studies in Saudi Arabia have compared the symptom ailments in hypertensive patients undergoing treatment and this study shows that complaints like blurred vision, chest pain, fainting episodes were more prevalent among patients aged more than 65 years. Fainting episodes were significantly more (p<0.024) among males aged >65 years than compared to those aged less than 65 years. Episodes of headaches were also a major complaint among patients aged 45-54 years, 55-64 years, and more than 65 years of age. Overall, younger age group patients experienced lesser symptomatic episodes as compared to those who were older. Some articles have shown the persistence of symptoms among non-compliant patients while other studies have ruled out any association between a headache and hypertension suggesting that there might be a self-awareness of the morbidity of the condition leading to the development of complaints [24-26].

CONCLUSION

The health-related quality of life is an ongoing event when a diagnosis of chronic health disorder is made due to which a person can be feeling better or worse depending on the treatment he is on. Primarily, this study assesses the quality of life of hypertensive patients but since it a cross-sectional study, it is difficult to show any temporal link between either symptoms or life quality and hypertension. Certainly, the study shows that most of them particularly females are quite well off and adjusted to their health status *vis a vis* regular treatment and follow up as long as they adhere to it. A longitudinal study is needed to find out this transition from a comfort zone early on to a life full of various

symptoms at later stages that could arise due to long term medication taken by the patients.

Limitation

Since this is a cross-sectional study, it cannot be used to analyze behavior over a period to time. Further cohort and follow up study are required to validate our preliminary findings.

DECLARATIONS

Conflict of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Acknowledgment

The authors gratefully acknowledge the kind support from the Research Committee, College of Medicine, Majmaah University, Majmaah, Saudi Arabia without which this project would not have been possible.

REFERENCES

[1] World Health Organization. WHOQOL Measuring quality of life. 1997, http://www.who.int/mental_health/media/68.pdf.

[2] Trevisol, Daisson J., et al. "Health-related quality of life and hypertension: a systematic review and meta-analysis of observational studies." *Journal of Hypertension,* Vol. 29, No. 2, 2011, pp. 179-88.

[3] Sazlina, S. G., et al. "Predictors of health-related quality of life in older people with non-communicable diseases attending three primary care clinics in Malaysia." *The Journal of Nutrition, Health, and Aging,* Vol. 16, No. 5, 2012, pp. 498-502.

[4] Thrall, Graham, et al. "Depression, anxiety, and quality of life in patients with atrial fibrillation." *Chest,* Vol. 132, No. 4, 2007, pp. 1259-64.

[5] Hayes, Donald K., et al. "Health-related quality of life and hypertension status, awareness, treatment, and control: National Health and Nutrition Examination Survey, 2001-2004." *Journal of Hypertension,* Vol. 26, No. 4, 2008, pp. 641-47.

[6] Mena-Martin, Francisco J., et al. "Health-related quality of life of subjects with known and unknown hypertension: results from the population-based Hortega study." *Journal of Hypertension,* Vol. 21, No. 7, 2003, pp. 1283-89.

[7] Poljičanin, Tamara, et al. "Diabetes mellitus and hypertension have comparable adverse effects on health-related quality of life." *BMC Public Health,* Vol. 10, No. 1, 2010, p. 12.

[8] Soni, Ritu K., et al. "Health-related quality of life in hypertension, chronic kidney disease, and coexistent chronic health conditions." *Advances in Chronic Kidney Disease,* Vol. 17, No. 4, 2010, pp. 17-26.

[9] Korhonen, Päivi E., et al. "Health-related quality of life and awareness of hypertension." *Journal of Hypertension,* Vol. 29, No. 11, 2011, pp. 2070-74.

[10] Banegas, José R., et al. "Association between awareness, treatment, and control of hypertension, and quality of life among older adults in Spain." *American Journal of Hypertension,* Vol. 19, No. 7, 2006, pp. 686-93.

[11] Mokdad, Ali H., et al. "The state of health in the Arab world, 1990-2010: an analysis of the burden of diseases, injuries, and risk factors." *The Lancet,* Vol. 383, No. 9914, 2014, pp. 309-20.

[12] El Bcheraoui, Charbel, et al. "Hypertension and its associated risk factors in the kingdom of Saudi Arabia, 2013: a national survey." *International Journal of Hypertension,* 2014.

[13] Memish, Ziad A., et al. "Peer reviewed: obesity and associated factors-Kingdom of Saudi Arabia, 2013." *Preventing Chronic Disease,* Vol. 11, 2014.

[14] El Bcheraoui, Charbel, et al. "Hypertension and its associated risk factors in the kingdom of Saudi Arabia, 2013: a national survey." *International Journal of Hypertension,* 2014.

[15] Hassan, Syed Tajuddin Syed. "Health-related quality of life among hypertensive patients compared with general population norms." *Health*, 2011.

[16] Trevisol, Daisson J., et al. "Health-related quality of life and awareness of hypertension." *Journal of Hypertension,* Vol. 30, No. 3, 2012, p. 629.

[17] Jia, Haomiao, and Erica I. Lubetkin. "The impact of obesity on health-related quality-of-life in the general adult US population." *Journal of Public Health,* Vol. 27, No. 2, 2005, pp. 156-64.

[18] Trevisol, Daisson J., et al. "Health-related quality of life and hypertension: a systematic review and meta-analysis of observational studies." *Journal of Hypertension,* Vol. 29, No. 2, 2011, pp. 179-88.

[19] Gottlieb, Daniel J., et al. "Association of usual sleep duration with hypertension: The sleep heart health study." *Sleep,* Vol. 29, No. 8, 2006, pp. 1009-14.

[20] Al Senany, Samira, and Amer Al Saif. "Assessment of physical health status and quality of life among Saudi older adults." *Journal of Physical Therapy Science,* Vol. 27, No. 6, 2015, pp. 1691-95.

[21] Camões, Miguel, et al. "Role of physical activity and diet in incidence of hypertension: a population-based study in Portuguese adults." *European Journal of Clinical Nutrition,* Vol. 64, No. 12, 2010, p. 1441.

[22] Nakanishi, Noriyuki, and Kenji Suzuki. "Daily life activity and the risk of developing hypertension in middle-aged Japanese men." *Archives of Internal Medicine,* Vol. 165, No. 2, 2005, pp. 214-20.

[23] Saeed, Abdalla A., et al. "Prevalence, awareness, treatment, and control of hypertension among Saudi adult population: a national survey." *International Journal of Hypertension*, 2011.

[24] Banegas, José R., et al. "Association between awareness, treatment, and control of hypertension, and quality of life among older adults in Spain." *American Journal of Hypertension,* Vol. 19, No. 7, 2006, pp. 686-93.

[25] Gus, Miguel, et al. "Behavior of ambulatory blood pressure surrounding episodes of headache in mildly hypertensive patients." *Archives of Internal Medicine,* Vol. 161, No. 2, 2001, pp. 252-55.

[26] Fuchs, F. D., et al. "Headache is not more frequent among patients with moderate to severe hypertension." *Journal of Human Hypertension,* Vol. 17, No. 11, 2003, p. 787.