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The Correlation between Blood pressure and Depression in Elderlies of AmirKola City

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ABSTRACT

Introduction*: The association between depression and blood pressure in the elderly had conflicting results. The present study performed to determine this association.*
Methods: *This cross- sectional study was a part of the evaluating the health status of elderly of Amirkola that was done on 1616 individual. Demographic data nicotine use, underlying disease and drugs were registered. Depression was identified based on GDS questioners. The result were analyzed by SPSS-18.*
Results: *1500 individuals with the mean use of 69.08±7.29 years that 831(55.4%) men and 669(44.6%) women had participated .933 individuals (62.2%)had hypertension and 637 individuals (42.5%) had depression. The prevalence of depression in the elderly with hypertension was significantly greater 44.5% versus 39.2% and (P=0.004).*
The average systolic(P=0.59) and diastolic blood pressure (P=0.72) among the elderly with and without depression dose not have significant differences. There is only a significant relationship between the men's diastolic blood pressure and depression. (P=0.047)
Conclusion: *Depression in elderly with high blood pressure was significantly higher. There is a significant inverse relationship between diastolic blood pressure and GDS score in men.*

Key words: *Depression, GDS score, blood pressure*

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INTRODUCTION

The increase of elderly population is one of the most important economic, social and health challenges in the 21st century (1). Due to the aging process, elderlies experience several problems including chronic diseases and psychological disorders, such as mild to severe stages of dementia and depression, frequent hospitalization, low life expectancy, a series of losses including the loss of spouse, low economic status, low physical health, and in general, the loss of independence and self-reliance. One of the most common mental health problems in elderlies is depression which shows different prevalence with obvious symptoms in different parts of the world (2). Geriatric depression [1] is also known as subthreshold depression or minor depression. Most elderlies at the risk of depression complain less about the feeling of sadness and desolation resulted from a depressed mood and sometimes they even deny it (3).

Research Background

Reid et al. (2005) compared different treatment strategies of hypertension on depression symptoms on 2317 patients in America. They found that the treatment with verapamil can be used as an alternative treatment to atenolol in patients with high blood pressure who are at risk of depression (11).
Lenoir et al. (2008) studied the relationship between hypertension and depression on 9294 elderlies above the age 65 years who lived at home in France. The mean age of the elderlies was 73 years. The results showed that 31% of the elderlies had most of depression criteria; furthermore, 77.5% of the elderlies suffered from high blood pressure and 49.5% took antihypertensive drugs. They found that systolic and diastolic blood pressure was low in depressive than non-depressive men and women (12).

[1] Depression in Elderlies

Luijendijk et al. (2008) investigated the correlation between the risk factors of cerebrovascular disease and depression on elderlies, with the mean age of 71 years, in Netherlands. According to the results, there was a significant correlation between the risk factors, including aging, femaleness, current smoking and the use of antihypertensive drugs, and depression symptoms during follow-up. It was found that current smoking, femaleness and the use of antihypertensive drugs increase the risk of depression (13).

In a meta-analysis study, Long et al. (2008) studied the relationship between hypertension and risk of depression through 5 studies on 9647 elderlies. The results indicated that the pooled RR was 1.16 at 95% confidence interval (0.91 - 1.42) i.e. hypertension is not a risk factor of depression (14).

Licht et al. (2009) compared hypertension between healthy people and patients with depression and anxiety disorders on 2981 participants in Netherlands. According to the results, there was not any significant difference between patients with anxiety disorders and the control group in terms of systolic and diastolic blood pressure. Furthermore, the systolic blood pressure was significantly low in patients with depression in comparison to the control group (5).

Kim et al. (2010) intended to determine the correlation between hypotension [2] and depression in elderlies, focusing on depression symptoms in elderlies with low blood pressure (hypotension) in the Republic of Korea. They found that there is a significant correlation between hypotension and depression. Moreover, they recommended that the elderlies with hypotension and depressed mood should be monitored carefully (15).

Delaney et al. (2010) aimed at investigating the correlation between depression symptoms and hypertension with 2 years of follow-up on 3914 patients in America. The results showed that patients with depression symptoms were not exposed to the high risk of hypertension. Furthermore, there was a significant positive correlation between tricyclic antidepressants and hypertension. Also, even after adjustment for covariates (Confounding Variables), depression was associated with slight changes in systolic (+2.4 mm HG; 95% CI: 0.2 to 4.7) and diastolic (+0.8 mm HG; 95% CI: -0.6 to 2.3) blood pressure (6).

Masayeli et al. (2011) conducted a comparative study to investigate the severity of depression between patients with hypertension and healthy people on 286 participants (each group: 143) with the mean age of 49 years in Isfahan. They found that the correlation between depression and hypertension can be a reciprocal multifactorial relationship which may have either a predisposing or supporting role (10).

In a meta-analysis study, Meng et al. (2012) intended to investigate whether depression increases the risk of hypertension. The results showed that depression increases the risk of hypertension (adjusted relative risk: 1.42; P=0.009; 95% CI: 1.09 to 1.86). They found that the risk of hypertension significantly and positively correlated with the length of follow-up and prevalence of depression (4).

In a cross-sectional study, Lanchros et al. (2014) investigated the effect of depression on hypertension control in patients at high risk of cardiovascular diseases on 5954 participants with the mean age of 57 years in Spain. Once they considered hypertension as a continuous variable, they found that only systolic hypertension was significantly low in depressive patients while diastolic hypertension was not affected (18).

Almas et al. (2014) intended to determine the correlation between uncontrolled hypertension, depression and anxiety on 590 patients. The results indicated that the odds ratio (OR) between uncontrolled hypertension and depression was 2.02 at 95% CI (1.44 to 2.83) and P-value ≤ 0.001; the correlation remained significant even after homogenizing the age and gender. It was also found that the correlation between hypertension and depression is independent of socio-demographic factors (8).

Agyei et al. (2014) investigated the relationship between psychosocial stress and hypertension among Ghanaians in Netherlands. The results showed that the prevalence of hypertension was 54.7%. About 20% of the participants had mild depression and 9% had moderate depression. There was not any significant relationship between psychosocial stress and hypertension (7).

In a cross-sectional study, Ma et al. (2015) intended to determine the risk factors of depression in elderlies with hypertension on 1064 participants age 60 years and above in China. According to the results, depression was more evident in unmarried elderlies. Moreover, the risk factors of depression were high in elderlies with stressful life and bad sleeping habits. They found that the duration of hypertension does not increase the risk of depression while the severity of hypertension increases the risk of depression (9).

MATERIALS AND METHODS

The current study is a cross-sectional, descriptive-analytic research was a part of the Cohort Model with the title ''The Health Status of Elderlies in Amirkola City'' conducted on all elderlies aged 60 years and above in Amirkola city (17).

Research Sample

The research sample included all the elderlies, aged 60 years and above, who referred to the Health Research Center of Babol University of Medical Sciences in Amirkola city.

Data Collection Methods

The required information was collected by a trained person using different standard questionnaires and through examination. All the questionnaires were filled out by interviewing the elderlies.

Furthermore, Geriatric Depression Scale (GDS) was used. The patients' blood pressure was measured using Omron digital Sphygmomanometer (Blood pressure device) in sitting and standing position; the measures were recorded as systolic and diastolic blood pressure. Data were entered to SPSS and the mean blood pressure was calculated in relation to depression status. Finally, the relationship between hypertension and depression was statistically analyzed based on Pearson Correlation Coefficient and the effect of different factors on depression was statistically analyzed based on Logistic Regression.

Data Analysis

Information was entered the computers and data were statistically analyzed based on Descriptive Statistics (Mean & SD), T-test, Chi-square, Pearson Correlation Coefficient, Logistic Regression, and One-way ANOVA using $SPSS_{18}$. The significance level was estimated about less-than-or-equal-to 0.05 (P≤0.05).

RESULTS

Almost 1616 elderlies participated in the current study amongst which 1500 elderlies, including 831 men (55.4%) and 669 women (44.6%), were eligible for the research inclusion

[2] Low Blood Pressure (LBP)

criteria. About 933 patients (62.1%) had hypertension; 637 elderlies (42.5%), including 399 women (62.6%) and 238 men (37.4%), suffered from depression indicating that depression was significantly higher in women than men ((π=0.001)In terms of occupation, bout 592 elderlies (39.5%) were housekeepers, 474 elderlies (31.6%) were employed non-housekeepers, 331 elderlies (22.1%) were retired and the rest either were unemployed or had unspecified jobs. In terms of education, about 954 elderlies (63.6%) were illiterate, 441 elderlies (29.4%) had either primary school or junior high school education, and 105 elderlies (7%) had either senior high school or university degree.

Depression / Variable	Group	With Depression	Without Depression	OP 95% XI	π−ϖαλυε
Hypertension	Yes	415 (55.5%)	518 (55.5%)	0.88 (0.77-0.99)	0.04
	No	222 (39.2%)	345 (60.8%)	1.09 (1.0-1.19)	
Sex	Male	223 (28.6%)	593 (71.8%)	3.68 (2.96-4.56) M vs. F	0.001
	Female	399 (59.6%)	270 (40.4%)		
Marital Status	Married	496 (38.7%)	785 (61.3%)	0.35 (0.25-0.47) M vs. Un-M	0.001
	Unmarried	141 (64.4%)	78 (35.6%)		
Use of Antihypertensive Drugs	Yes	355 (38.6%)	565 (61.4%)	1.50 (1.22-1.85) Yes vs. No	0.001
	No	282 (48.6%)	298 (54.1%)		
Occupation	Unemployed	69 (54.1%)	26 (27.4%)	-	0.001
	Housekeeper	341 (57.6%)	221 (66.8%)		
	Retired	110 (33.2%)	251 (42.4%)		
	Employed Non-housekeeper	114 (24.1%)	360 (75.9%)		
	Unspecified	3 (37.5%)	5 (62.5%)		
Education	Illiterate	439 (46%)	515 (54%)	-	0.001
	Primary and Junior High School	176 (39.9%)	265 (60.0%)		
	High School and University	22 (21%)	83 (79%)		
BMI	<25	192 (38.9%)	302 (61.1%)	-	0.053
	25.99 - 29	273 (42.6%)	368 (57.4%)		
	≥30	172 (47.1%)	193 (52.9%)		

Table 1: Basic Information of Elderlies in Amirkola City in Relation to Depression (2011-2012)

As presented in Table 1, the frequency of depression in hypertensive elderlies (44.5% versus 39.2%) was significantly high (**π=0.04**). Moreover, the frequency of depression in elderlies who took antihypertensive drugs (48.6% versus 38.6%) was significantly high (**π=0.001**).

Variable	Depression	Number	Mean ± SD	π−ϖαλυε
Systolic Blood Pressure	With	637	141.00 ± 20.90	0.59
	Without	863	140.41 ± 22.09	
Diastolic Blood Pressure	With	637	80.36 ± 11.82	0.72
	Without	863	80.57 ± 10.67	
Age	With	637	69.22 ± 7.18	0.54
	Without	863	68.99 ± 7.38	
BMI	With	637	27.44 ± 4.74	0.057
	Without	863	26.99 ± 4.41	
The Number of Associated Underlying Disease	With	637	3.45 ± 2.04	0.001
	Without	863	2.15 ± 1.66	

Table 2: The Comparison between the Intended Quantitative Variables amongst Elderlies in Amirkola City in Relation to Depression (2011-2012)

As displayed in Table 2, the mean of systolic blood pressure in the depressive and non-depressive elderlies was respectively 141.00 and 140.41 mm Hg indicating not any significant difference (**π=0.59**). The mean of diastolic blood pressure in the depressive and non-depressive elderlies was respectively 80.36 and 80.57 mm Hg showing not any significant difference (**π=0.72**). Furthermore, elderlies with depression had a higher number of associated underlying diseases than non-depressive elderlies (**π=0.001**).

Variable	Systolic Blood Pressure	Diastolic Blood Pressure	ΓΔΣ	Age
Systolic Blood Pressure	**1**	ρ=0.736 π=0.001	ρ=0.034 π=0.18	ρ=0.129 π=0.001
Diastolic Blood Pressure	ρ=0.736 π=0.001	1	ρ=0.028 π=0.27	ρ=0.079 π=0.002
ΓΔΣ	ρ=0.034 π=0.18	ρ=0.028 π=0.27	1	ρ=0.014 π=0.57

Age	ρ=0.129 π=0.001	ρ=0.079 π=0.002	ρ=0.014 π=0.57	1

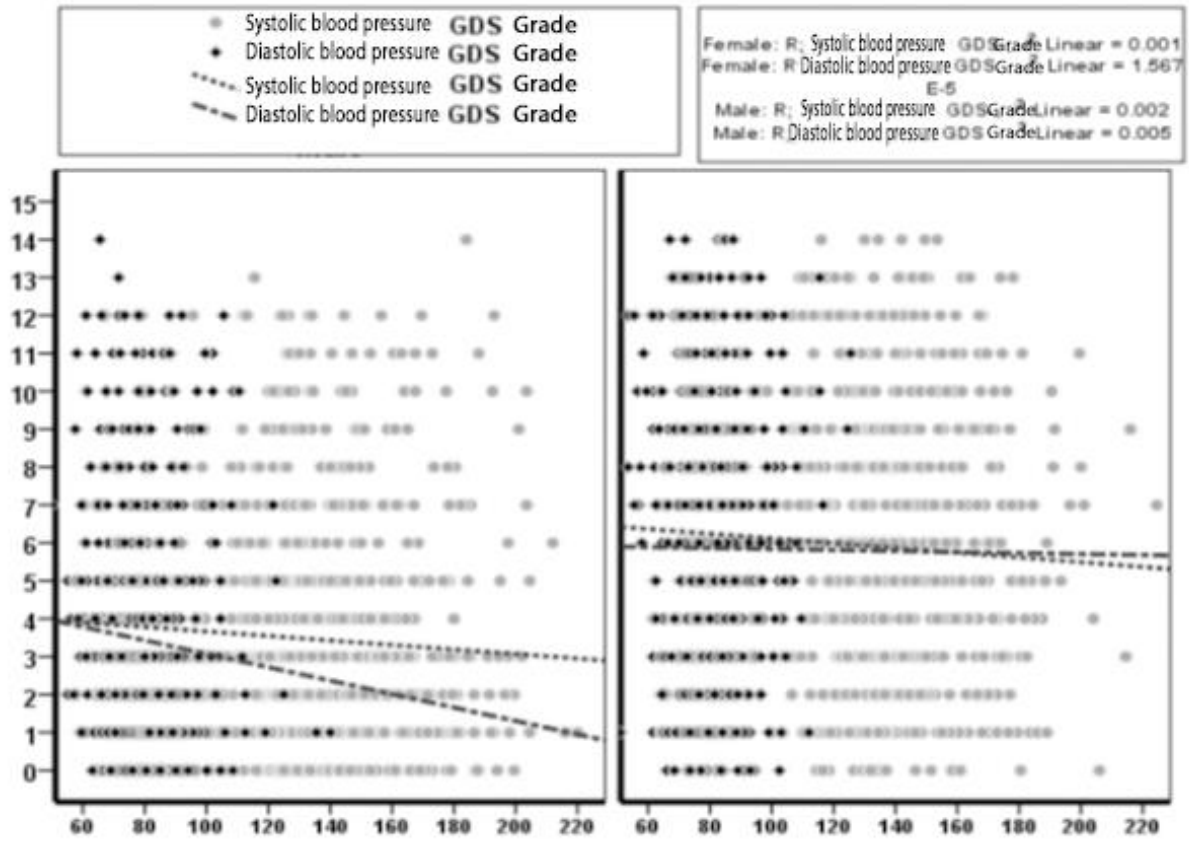
Table 3: Correlation Coefficient between some of the Intended Variables amongst the Elderlies in Amirkola City (2011-2012)

According to Table 3, there was not any significant correlation between □□□□and the systolic and diastolic blood pressure amongst the elderlies in Amirkola city.

Sex	Variable	Systolic Blood Pressure	Diastolic Blood Pressure	ΓΔΣ	Age
Male	Systolic Blood Pressure	1	ρ=0.752 π=0.001	ρ=0.044 π=0.20	ρ=0.124 π=0.001
	Diastolic Blood Pressure	ρ=0.752 π=0.001	1	ρ=0.069 π=0.47	ρ=0.076 π=0.029
	ΓΔΣ	ρ=0.044 π=0.20	ρ=0.069 π=0.47	1	ρ=0.043 π=0.21
	Age	ρ=0.124 π=0.001	ρ=0.076 π=0.02	ρ=0.043 π=0.21	1
Female	Systolic Blood Pressure	1	ρ=0.715 π=0.001	ρ=0.037 π=0.33	ρ=0.140 π=0.001
	Diastolic Blood Pressure	ρ=0.715 π=0.001	1	ρ=0.00 π=0.91	ρ=0.081 π=0.03
	ΓΔΣ	ρ=0.037 π=0.33	ρ=0.004 π=0.91	1	ρ=0.059 π=0.12
	Age	ρ=0.140 π=0.001	ρ=0.081 π=0.03	ρ=0.059 π=0.12	1

Table 4: Correlation Coefficient between some of the Intended Variables in Relation to Sex amongst the Elderlies in Amirkola City (2011-2012)

As presented in Table 4, there was a significant negative correlation between □□□□and diastolic blood pressure.



Male **Female**

Graph 1 above illustrates the correlation between ΓΔΣ and the systolic and diastolic blood pressure in relation to sex amongst the elderlies in Amirkola city during 2011-2012. There was a significant negative

correlation between **ΓΔΣ** and diastolic blood pressure amongst male elderlies. However, there was a negative, but not significant, correlation between **ΓΔΣ** and blood pressure amongst female elderlies.

Depression / Hypertension	Normal	Mild	Moderate	Severe	π−ϖαλυε
Yes	518 (60%)	262 (65.5%)	110 (67.1%)	43 (58.9%)	0.13
No	345 (40%)	138 (34.5%)	54 (32.9%)	30 (41.1%)	

Table 5: The Comparison of Hypertension Frequency amongst the Elderlies in Amirkola City in Relation to Depression

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Table 5 shows that there was not any significant difference in hypertension frequency between the elderlies in relation to depression ($\pi=0.31$).

CONCLUSION

The present study intended to determine the correlation between Blood pressure and depression in the elderlies in Amirkola City during 2011-2012. The results indicated that, in terms of quality, depression was more prevalent in hypertensive elderlies whereas, in terms of quantity, there was a negative correlation between $\Gamma\Delta\Sigma$ and hypertension amongst both men and women which was only significant in the diastolic blood pressure of men. On the contrary, there was not any significant correlation between $\Gamma\Delta\Sigma$ and diastolic blood pressure amongst women and between $\Gamma\Delta\Sigma$ and systolic blood pressure amongst both men and women. Furthermore, there was not any significant difference between the frequency of hypertension in relation to depression amongst elderlies. However, femaleness and the use of antihypertensive drugs increased the risk of depression in elderlies.

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