Research Article

PSYCHOLOGICAL DISTRESS AND COMPONENTS OF ANGER: PREDICTORS OF HYPERTENSION DEVELOPMENT

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ABSTRACT

Psychological distress is the combine effect of depression, anxiety and stress. The present study explored the variables like psychological distress (depression, anxiety, stress) and components of anger as predictors of hypertension development. Total sample of 360 participants, outdoor hypertensive patients N = 216 between ages 30-60, and their age matched healthy control group N= 144, was taken from outdoor departments of three public hospitals by using purposive sampling technique. Protocols used in the study were; DASS (Lovibond & Lovibond, 1995); Urdu version (Potangaroa, 2006); and STAXI (Spielberger, 1988). Mantle haenzel test of linear association, logistic regression and independent samples t- test were carried out for data analysis. The results indicate significant correlation between psychological distress and hypertension ($\chi^2 MH$ =79.95, p<. 001). Depression, anxiety, stress, state anger, trait anger, anger-in, anger-control, anger expression and anger turned out to be the strongest predictors of hypertension. The result also shows significant differences on depression, anxiety stress and anger between hypertensive and non-hypertensive groups.

KEYWORDS: Hypertension, depression, anxiety, stress, anger

INTRODUCTION

Increasing health problems draw the attention of physicians and researchers to focus the potential risk factors responsible for different diseases in human beings. Hypertension is one of those diseases which cause great damage to health and turn out many chronic conditions in human body (Grimsrud, Stein, Seedat, Williams, & Myer, 2009). Despite the efforts for preventive measures, the spread of hypertension is continuing and adversely affecting the mental and physical health of people of different nations across the globe. It is considered a major cause of strokes in cardiac arrest and kidney failures (Danish, 2008). Hypertension affects one in every 3 individuals over the age of 45years. Schlomann and Schmitke (2007) point out hypertension as a major reason for hospital visits. It is an important ground in two of the top three causes of death.

There are many factors associated with hypertension, which include biological, socio-cultural and psychological. Psychological condition of an individual greatly affects the clinical symptoms of hypertension. Many studies demonstrate the role of psychological factors in escalating hypertension (Kaplan & Nunes, 2005). In an earlier study it was reported that under emotional tension blood pressure increases greatly for a short or long period of time and remains on the higher side even after the emotional shock is over (Alexander, 1939).

Thus hypertension may rightly be called an emotional disease. Kaplan and Nunes elucidate that hypertensive patients think themselves very insecure, apprehensive, tense and irritated. When they experience frustration, their blood pressure raises. If they are given the chance to express their anger and release their hostile impulses against the source, their blood pressure become normal. The role of emotionally and socially based variables in hypertension has remained a topic of interest for psychologists. Grewen, Girdler, Hinderliter, and Light (2006) report noteworthy association of depression with hypertension among those having hypertensive mother and father as compared to those having normal parents.

Majority of the researches establish combine effect of both depression and anxiety in developing hypertension. Moreover, anxiety and depression are common features of hypertensive patients (Löwe et al. 2004). Furthermore, Johannessen, Strudsholm, Foldager, and Munk-Jørgensen (2003) elucidate that high blood pressure is found among patients with depression and anxiety. Fabrice et al. (2005) explored link between depression and hypertension and further added that hypertensive patients coexisting with depression are at increased risk of unfavorable health outcomes. Everson, Kaplan, Goldberg, and Salonen (2000) explored individuals reporting high levels of hopelessness at baseline were three times more likely to become hypertensive in near future. Men who showed moderate level of hopelessness were not significantly at higher risk of developing hypertension. Thus it can be concluded that depression is a risk factor of hypertension.

The relationship of depression with hypertension is well documented but there is disagreement about the predictive nature of depression. Rutledge and Hogan (2002) concluded that anxiety but not depression causes hypertension,

still others (Davidson, Jonas, Dixon, & Markovitz, 2000) claim that depression is a strong predictor of hypertension. However many researchers agree that depression and hypertension are reciprocally correlated, depression leads to hypertension (Hildrum, Mykletun, Holmen, & Dahl, 2008) and hypertension raises the level of depression (Jonas, Frank, & Ingram, 1997). Klein, Lewinsohn, Rohde, Seeley, and Durbin (2002) reported that depression is frequently found among the relatives of depressed people. John, Carvalho,

Derek, and Hopko (2011) elucidate that some situational changes and avoidant behaviors stop people to pass through social reward and reinforcement, which ultimately creates depression and found that emotionally disturbed individuals with low level of patience for pain, and greater level of negative urgency are prone towards depression and suicidal ideations.

Anxiety has been observed as the most significant cause of hypertension in many researches. Paterniti et al. (1999) observed a strong correlation between anxiety and hypertension. Similarly Jonas, Frank, and Ingram (1997) argue that high anxiety and high depression are independent predictors of incident hypertension. Anxiety is reported as a main feature of their personality (Friedman & Bennet 1997). Pickering, (2007) reported the association of hypertension with negative effect which is manifested in the form of depression, anxiety, anger or hostility. Similarly Jonas, and Lando (2000) explain that increased negative effect is associated with hypertension.

Matthews, et al. (2004) have shown that young adults who show a high blood pressure response to psychological stress may be at risk for hypertension as they are grown up. Thus it can be concluded that stress taking individuals are prone to hypertension from the very beginning of their life.

The most important factor in anger is that whether individual is becoming angry easily or becoming angry and could not express anger. Historically it roots back to 1939, when Alexander identified the suppression of anger as a major cause of hypertension and further investigated its lethal effects upon human body. Alexander (1939) explored clear-cut association between psychological stress and variations in blood pressure after an in-depth psychoanalytic study of a patient suffering from hypertension. Anger-in theory presented by Alexander tells that unexpressed hostile impulses are responsible in developing chronic emotional conditions, which ultimately lead to hypertension. Psychological stress is defined as inhibited and not suppressed anger which turned inside the patient in the form of depression and to some extent these feelings were expressed outside in the shape of hostility.

This psychological tension coexists with anxiety and fretful condition of mind. Dressler and dos Santos (2000) define socio-cultural theory and says social and cultural environment entails health problems of the residents of that society. Some societies have enormous number of hypertensive patients and some others like traditional clans in Amazon Basin experience no or very less high blood pressure.

Pakistan is a developing country where sources to earn livelihood are meager and prevalence of hypertension is 26%. Prevalence of hypertension among Pakistani males is 34% and among females is 24%. It is frequently prevalent in men after 35 years of age than women of that age and 58% of the patients are unaware about their suffering from hypertension (Safdar, Omair, Faisal, & Hasan, 2004). Additionally there are an estimated 12 million hypertensive patients in Pakistan (Nishter, 2001). It affects one in every 3 individuals over the age of 45years (National Health Survey 1994). Shah et al. (2001) have reported that more than 24.3% of the population over the age of 18 years and 36% over the age of 45 years is the sufferer of hypertension in one metropolitan city of Rawalpindi.

Thus it may be argued that hypertension is wide spread in different areas of Pakistani society. The medical treatment of hypertension is very expensive and unbearable for lower middle class of Pakistan. To spend the resource expenditures on the treatment is a stab upon the economy of a developing country like Pakistan.

Therefore, it was planned to conduct a research which will focus upon the vital role played by psychological variables in the development of hypertension.

METHOD AND MATERIAL

Research Design and Sample

Correlation research design was used in the present research. Sample of 360 participants, hypertensive patients (N = 216, males = 125, females= 91), and non-hypertensive group (N = 144, males = 94, females = 50) with age range between 30-60 years was taken from outdoor departments of three public hospitals by using non-probability purposive sampling technique. Inclusion criteria for hypertensive patients was settled that age ranged between 30 to 60 years and both males and females' patients were taken as participants of the study, who had been currently taking medicines for hypertension, having a confirmed diagnosis of hypertension by medical specialists, able to read and write Urdu language and who were willing to participate were taken as sample. Non-hypertensive people were matched to every case of hypertension

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for age, gender, monthly income and working hours. Inclusion criteria for non-hypertensive people was that it was taken from the hospital and they were the visitors or non-blood relatives of the cases diagnosed with hypertension and the participants with no past, current or family history of hypertension were included in the sample.

Hypertensive Patients: Age range of hypertensive patients was from 30-60 years (M = 47.00, SD = 8.27). Their monthly income ranged from Rs. 5000-85000 (M = 28236.11, SD = 13891.76). Mean weight of the participants was 76.91 (SD = 8.63). Their working hours ranged from 4-8 (M = 8.63, SD = 4.14). Ten (5 %) of the participants were not new in city and 206 (95%) were new in metropolitan city. Similarly 28 (13%) were not living in a joint family system but 188 (87%) were living in joint family system.

Non- hypertensive group: The age range of the non-hypertensive participants was from 30-60 years (M = 43.00, SD = 8.10). Their monthly income was from Rs. 5000 to 85000 (M = 37881.94, SD = 21002.32). The weight of non-hypertensive group was (72.71, SD = 10.35). Their working hours ranged from 4-10 (M = 7.86, SD = 3.35), 37 (26%) were new in city and 107 (74%) of the participants were not new in city and 93 (65%) were not living in a joint family system and 51 (35%) were living in joint family.

Criterion Variable: Hypertension was studied as criterion or outcome variable and it was dichotomized into 2 groups based upon their being

hypertensive and not hypertensive and were coded as: non-hypertensive = 0; and hypertensive = 1.

Predicting Variables: Depression, anxiety, stress, state anger, trait anger, anger in. anger out, anger control, anger expression were taken as predicting variables of hypertension.

Instruments

A demographic information form was developed to gather information about age, education, occupation, number of children, monthly income, monthly expenditures, weight, family history of hypertension, family system and working hours of the research participants.

1. Depression, Anxiety and Stress Scale (DASS). DASS is a self report instrument designed to measure the 3 relatively negative states of depression, anxiety and stress of an individual. It is developed by Lovibond and Lovibond (1995) and it consists of 42 items. Each item has four optional responses which are scored on Likert scale from 1(did not apply to me at all) to 4 (applied to me very much). Reliability alpha = .91 for depression scale, .84 for anxiety scale and .90 for stress scale are reported by authors.

Urdu translation of DASS by Potangaroa (2005) was used in the present study.

Table 1: Reliability Analysis of the Depression, Anxiety and Stress Scale

Scale	No. of items	α
Depression	14	.91
Anxiety	14	.84
Stress	14	.90

2. State Trait Anger expression Inventory (STAXI). STAXI is developed by Spielberger (1988), consists of 44 items. The items are divided into six subscales and overall anger which are state anger, trait anger, anger-in, anger-out, anger-control and anger expression. Each item has four optional response

scored on 4-point Likert scale, range from 1 (never) to 4 (very often). The respondents can obtain scores from 44 to76. Spielberger reported that STAXI has high internal consistency with α = .95. STAXI was adapted into Urdu language and used in the present research with overall α .91.

Table 2: Reliability Analysis of the Depression, Anxiety and Stress Scale (Urdu)

Scale	No. of items	α
State anger	10	.90
Trait anger	10	.80
Anger-in	8	.87
Anger-out	8	.71
Anger-control	8	.81
Anger	44	.93

PROCEDURES

Official permission was sought from hospital authorities for data collection and consent was obtained from the participants suffering from hypertension and healthy controls. Before administration of Urdu versions of DASS and STAXI, participants were briefed about the nature and purpose of the study. Rapport was established by assuring them of the confidentiality of their personal information and that it would be used for research purpose only. Demographic form, DASS and STAXI were individually administered to all of the research participants.

RESULTS

Descriptive statistics were computed to provide a preliminary profile of the sample characteristics. Reliability alpha coefficients indicate that the scales indicate that there is reasonable internal consistency among items of each scale (Table 1 & 2). Mentle haenzel test of linear association was carried out to explore the relationship between psychological variables and hypertension.

Logistic Regression analysis was run to find predictors of hypertension. Independent samples t test was used to find out differences on psychological

variables between two groups and also between hypertensive males and females.

The results given in the Table 3 indicate that association of hypertension with depression (χ^2MH =79.64, P < .01), anxiety (χ^2MH =74.56, P < .01) stress (χ^2MH =85.21, P < .01) overall psychological distress (χ^2MH =79.95, P <.01) is statistically significant. Similarly, the values given in the Table 3 show that state anger (χ^2MH =64.62, P < .01), anger-in (χ^2MH =79.25, P < .01), anger-control (χ^2MH =73.55, P < .01), anger-expression (χ^2MH =51.88, **P < .01), and anger (χ^2MH =75.47, P < .001), have significant association with hypertension.

The results also indicate reverse association of anger-out (χ^2MH =11.20, P < .05) with hypertension.

Predictors of Hypertension

A logistic regression analyses was run to determine the psychological factors as predictors of hypertension. The results shown in Table 4 indicate that depression, anxiety stress, and anger expression come out as strongest predictors of hypertension.

Table: 3 Relationship between Subscales of DASS, STAXI and Hypertension (*N* = 360, *df* = 1)

Psychological Variables	*M*	*SD*	$\chi^2{}_{MH}$	*p*
Depression	28.78	15.98	79.64	.001**
Anxiety	22.48	10.90	74.56	.001**
Stress	32.21	16.00	85.21	.001**
Distress (DASS)	82.18	41.85	79.95	.001**
State anger	15.78	6.80	64.62	.001**
Trait anger	21.80	9.90	81.69	.087
Anger-in	17.78	6.80	79.25	.001**
Anger-out	15.38	5.24	-11.20	.021*
Anger-control	19.43	9.68	73.55	.001**
Anger-expression	29.60	7.64	51.88	.001**
Anger	115.88	35.78	75.47	.000***

Note: M = Mean scores, SD = Standard deviation of scores, $\chi^2{}_{MH}$ = Maentle Haenzel
Chi-square *= *p*<.05; **= *p*<.01; *** = *p*<.001

Table: 4 Logistic Regression Analysis to Examine Psychological Distress and Components of Anger as (predictors) of Hypertension (*N* = 360)

Variable	B	S.E	Lower	OR	Upper
Constant	-29.85	17.74			
Depression	.55***	.12	1.37	1.64	2.22
Anxiety	.49***	.10	1.29	1.71	1.40
Stress	.20**	.09	1.12	1.35	1.62
Psychological	.33***	.06	1.23	1.40	1.58

distress (DASS)					
State anger	.42***	.06	1.25	1.42	1.66
Anger-in	.38***	.07	1.30	1.45	1.70
Anger-out	-.13**	.02	.82	.87	.92
Anger-control	.18***	.04	1.11	1.20	1.30
Anger-expression	.94***	1.94	.98	5.73	12.35
Anger total	.08***	.01	1.05	1.08	1.11

Note: R^2 = 51.66 (Hosmer & Lemeshow), .75 (Cox & Snell), .70 (Negelkerke). Model $\chi 2$ (21) = 51.60, OR = Odds ratio, **p<.01,***p<.001.

Interpretation of coefficients

The findings given in Table 4 shows odd ratios for depression is 1.64 and B = .55. The coefficient is positive, therefore as the depression increases by one scale unit, chances of hypertension in a person is increased 1.64 times. The odds for anxiety is 1.71 and B = .49 which shows that as the anxiety is increased by one scale unit chances of hypertension in a person would increase 1.71 times. The odd ratio for stress is 1.35 and B= .20. The coefficient is positive and odds ratio is 1.35, therefore as scores in stress increase by one scale unit increase of hypertension would increase 1.35 times. Similarly the odds for psychological distress (OR= 1.40, p <0.001), state anger (OR= 1.42, p <0.001), anger-in (OR= 1.45, p <0.01), anger expression (OR= 1.20, p <0.01), and total anger (OR= 1.08, p <0.01) indicate that with increase of one scale unit in the odds of these psychological variables there will be increase in the rate of hypertension development. The odd ratio for anger-out is .87 and B= -.13. The coefficient is negative, so each scale unit increase in scores of anger-out is associated with decrease in hypertension by a factor of .87 (95% CI .82-.92, p < .01).

Table: 5 Mean Scores of Hypertensive and Non-hypertensive Groups on Subscales of DASS & STAXI (*N*=360)

Variables	Hypertensives (n=216)		Non-Hypertensive (n=144)		t df (358)	Cohen's d	95% C.I	
	M	SD	M	SD			LL	UL
Depression	18.43	34.47	34.47	14.30	-10.42***	1.19	-19.07	-13.01
Anxiety	16.32	8.27	28.32	12.19	-9.74***	1.15	-14.42	-9.58
Stress	22.55	12.05	38.64	13.50	-10.96***	.93	-18.98	-13.20
Psychological Distress	54.93	32.48	32.45	12.78	-11.64***	.91	-54.64	-36.59
State anger	18.44	6.57	13.06	5.32	7.74*	.90	4.01	6.75
Trait anger	24.84	8.06	17.72	8.08	7.78*	.88	5.31	8.91
Anger-in	21.67	7.31	13.22	6.55	10.58**	1.21	6.87	10.01
Anger-out	13.74	4.86	16.24	5.19	-2.49*	-.49	-3.61	-1.38
Ang./Exp.	24.11	6.37	16.76	8.79	8.81***	.95	5.71	8.99
AX/EXP	27.29	7.14	28.02	9.63	-.78	-.08	-2.54	1.09
Anger Total	97.20	36.28	47.42	16.36	11.74	1.29	35.54	49.84

CI - Confidence Interval; LL - Lower Limit; UL-Upper Limit, Ang./EXP. = Anger expression

The results in Table 5 shows significant difference of depression, anxiety, stress, state anger, trait anger, anger-in, anger-out, anger-control, anger-expression and anger between hypertensive and non-hypertensive group. Cohen's d shows that depression, anxiety, stress, state anger, trait anger, anger-in, anger-out, anger-control and anger have larger effect on hypertensive patients as compared to non-hypertensive group.

DISCUSSION

The present study is carried out to explore the relationship of hypertension with psychological variables of depression, anxiety, stress and anger. Further it also designed to determine the predictors of hypertension and to examine the difference between hypertensive and non-hypertensive people. It was hypothesized that there is likely to be a relationship between depression, anxiety, stress, and anger and hypertension. Secondly, depression, anxiety, stress and anger components are likely to be the strongest predictors of hypertension and lastly there will be difference in depression, anxiety, stress and components of anger between hypertensive patients and non hypertensive group. The findings indicate that hypertension has significant relationship with psychological factors of depression, anxiety, stress and different dimensions of anger (Table 3, p < 0.01). Similarly depression, anxiety, stress, anger-in, anger control and anger expression come out as strongest predictors of hypertension (table 4, p < .o1). Findings also revealed as hypothesized that there is significant difference in depression, anxiety, stress and different dimensions of anger between hypertensive patients and non-hypertensive controls (Table 5, p< 0.01).

Main finding of the study is consistent that depression is correlated with hypertension to Bruce and Kim (1992) point out that hypertensive patients set higher goals and cannot pursue those due to less motivation and ultimately suffer from depression. Bruce and Kim (1992) add that stressful life events play an important role in the development of depression in hypertensive patients. Sideridisa (2005) endorses and appends that depression occurs due to less motivation for work and performance avoidance goals. The finding is in line with previous literature suggest significant relationship of depression with hypertension Hildrum, Mykletun, Holmen and Dahl, (2008).

Additionally anxiety was found to be significantly associated with and turned out a strong predictor of hypertension. The current finding is consistent with those of (Borde-Perry, 2002; Vural, 2007) Hildrum, Mykletun, Holmen and Dahl, (2008) who found significant relationship between anxiety and hypertension. This may be described in context of Kendler, Karkowski, and Prescott (1998) who say anxiety starts when circumstances around individual become risky and individual tries to overcome the hardships. Comer (2001) argues that socio-cultural conditions lead the person to develop anxiety. The previous researches have concluded that anxiety is a strongest predictor of hypertension. Paternitti, et al. (1999) stated that anxiety levels are predictive of later incidence of hypertension.

Furthermore, stress was found to be statistically significant among hypertensive patients. These findings are consistent with those of Ming et al.,

(2004), and Player (2007) who have reported that psychological stress is significantly related with hypertension. This may be explained in context of Hobfoll's (1989) theory of conservation of resources (COR) which refers that individuals who lack enough resources are most likely to pass through cycles of resource losses that may lead to chronic depletion of emotional, cognitive and physical resources to progress burnout. Goreczny, (2000), discusses job strain model of occupational stress proposed by Karasek and Theorell (1990). This model predicts hypertension on the basis of one's control on one's job and job demands. If an individual has no control over his surroundings he/she may become a victim of psychological stress. It was proposed that both men and women are affected differently by hypertension due to occupational stress and men are three times more likely to develop hypertension. Matthews et al. (2004) further append that people who experience greater elevation in blood pressure during mental stress are more likely to experience hypertension in future. Ming et al. (2004) elaborated that raise in blood pressure in response to stress is a sign of future hypertension development. Our finding about predictive nature of stress is supported by (Flaa, Eide, Kjeldsen, & Rostrup 2008).

The results also revealed that anger is significantly correlated with hypertension. There is sufficient empirical evidence which suggests that anger is strongly associated with hypertension (Player et al. 2007). The previous research findings suggest that being easily angered is significantly associated with hypertension. Thomas, Richard, Nelesen and Dimsdale, (2004) found anger suppression to be strongly associated with systolic blood pressure among all participants of the study. Anger suppression was strongly related to increase in systolic blood level. An earlier reported study on hypertensive people by Porter, Stone, and Schwartz, (1999) explored blood pressure rises remarkably during anger states. Reactivity hypothesis describe that individuals prone to be hypertensive act intensely in respond to environmental stress.

Last results of the present research are consistent with those of Patten et al. (2009); and Vural, Satiroglu, Akbas, Goksel and Karabay (2007) who found statistically significant difference in depression and anxiety between hypertensive patients and non-hypertensive controls. Furthermore, stress is statistically significant factor in hypertensive patients. In line with Carroll et al. (2001), psychological stress is significantly associated with hypertension.

Additionally state anger was found significantly higher in hypertensive patients. These findings are consistent with earlier findings of Porter, Stone and Schwartz (1999 where it is reported that hypertensive patients experience more state anger than normal individuals. These findings further support the first hypothesis that there is difference in trait anger between hypertensive and non hypertensive groups show that trait anger is significantly higher in hypertensive patients. This result is consistent with those of Player, (2007) where it was found that trait anger in adults was associated with increased risk of developing hypertension.

Further analysis of the first hypothesis revealed that anger-in or anger suppression is also significantly higher and a predictor in hypertensive patients. There is sufficient empirical evidence to support these findings i.e.

Pickering (2007). These researches have also reported that anger suppression is significantly greater in hypertensive patients. Moreover Alexander (1939) and Pickering (2007) have found strong association of anger suppression with hypertension. Thus, the findings support the prediction that there is difference with respect of depression, anxiety, stress, state anger, trait anger, anger in, anger out, anger control, anger expression and total anger between hypertensive patients and non hypertensive group.

Limitations

The main limitation of the current research was that the research was a carried out with a small sample taken from three public hospitals only, which may not be true representative of the entire hypertensive population. It may be a threat to the external validity of this research. A large scale national survey may be conducted to determine the role of psychological factors in developing hypertension.

Conclusion: It is concluded that there is positive relationship between psychological risk factors and hypertension. Furthermore, depression, anxiety, stress and anger expression turned out the strongest predictors for hypertension.

Implications

The findings of this research have implications for promoting the understanding of psychological risk factors of hypertension in Pakistani population in order to introduce effective preventive measures to reduce the prevalence of hypertension.

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