

Anger as a Psychological Risk Factor of Hypertension

Pakistan Journal of Psychological Research

June 30, 2014 Monday

Copyright 2014 Quaid-e-Azam University All Rights Reserved

Section: Vol. 29; No. 1

Length: 6766 words

Byline: Mamoon Mushtaq and Najma Najam

Body

The present research was conducted to explore the relationship of anger and its components like state-anger trait-anger anger-in anger-out anger-control and anger-expression with hypertension. Further to explore the role of anger as psychological risk factor in predicting hypertension. A sample of 237 participants (hypertensive patients = 137; non-hypertensive age matched healthy controls = 100) with age range 30 to 65 years ($M = 45$; $SD = 8.37$) was taken from outdoor departments of public hospitals. State Trait Anger Expression Inventory (Spielberger 1988) translated in to Urdu language by Mushtaq (2012) was used to assess anger and its dimensions. The analyses revealed significant positive relationship between dimensions of anger and hypertension.

State-anger trait-anger anger-in anger-control and anger turned out to be psychological predictors of hypertension in binary logistic regression analysis. Significant differences were found on anger and its dimensions between hypertensive men and women.

Keywords: Hypertension State-anger Trait-anger Anger-in Anger- Out Anger-control

Hypertension is rapidly pervasive among different nations of the world. It brings about multiple chronic conditions in human body (Grimsrud Stein Seedat Williams and Myer 2009) without apparently noticeable symptoms and is often called a silent killer (Barcelo 2000). Hypertension affects the overall body functioning and human life in many ways. Untreated patient with hypertension has an average life expectancy between 50-60 years compared with 71 years for the population at large. Prevalence of hypertension among Pakistani men is 34% and among women is 24% (Safdar Omair Faisal and Hasan 2004). It is frequently prevalent in men after the age of 35 years than women of that age and 58% of the patients are unaware that they are suffering from hypertension. Research data support that women also suffer from high rate of hypertension (Steele and McGarvey 1997).

Additionally there are an estimated 12 million patients with hypertension in Pakistan (Nishter 2001). Shah Luby Rahbar Khan and McCormick (2001) have reported that in Rawalpindi Division more than 24.3% of the population over the age of 18 years and 36% over the age of 45 years suffers from high blood pressure. Shah et al. also reported that there are 23% men with hypertension in Karachi. Thus it may be concluded that hypertension is wide spread in different areas of Pakistan; is rapidly increasing; scantily treated and controlled; and is a great health hazard.

Psychological condition of an individual greatly affects his physical condition. Anger is a normal emotion but if increases can cause devastating effects upon body and most conspicuously upon heart (Williams Nieto Sanford Couper and Tyroler 2002). It has been observed that occasionally healthy persons may also have conspicuous boost in their blood pressure if they are angry (Spielberger Jacobs Russell and Crane 1983). Borteyrou Bruchon-Schweitzer and Spielberger (2008) explain that anger is an arousing state which consists of feelings that vary in intensity from mild irritation to intense fury or rage. It is reported that anger arousing situation also becomes a great reason of increase in blood pressure (Gerin et al. 2006).

Anger as a Psychological Risk Factor of Hypertension

Historically it roots back to 1939 when Alexander identified the suppression of anger as a major cause of hypertension and further investigated its lethal outcomes upon human body. Reactivity hypothesis describes that individual prone to hypertension reacts to environmental stress with intense anger (Light 2001). In an earlier study on people with hypertension Landesbergis Schnoall Warren Pickering and Schwartz (1994) explored that blood pressure rises remarkably during anger states. Association of anger with hypertension has been confirmed by many researchers (Player King Mainous and Geesey 2007; Rutelage and Hogan 2002; Webb and Beckstead 2001) which is a well-established risk factor for coronary heart disease (Player et al. 2007). Borde-Perry Campbell Murtaugh Gidding and Falkner (2002) further append that there is an association between hypertension and cardiovascular diseases.

Anger has many facets which affect the body equally but are different in nature and expression as described by Spielberger (1988). State-anger is explained as a psycho-physiological condition comprising of subjective feelings that is different in emotion from mild resentment to intense anger and is related to the activation of autonomic nervous system. Trait-anger is defined in terms of variation from person to person in the frequency of occurrence with which state-anger is experienced over time. So trait-anger may rightly be called intense fury with greater frequency of occurrence. Next dimension of anger is anger-in or anger suppression. This is the attribute of a person how often he/she experiences but held in or suppresses anger. It refers to the frequency with which angry feelings of an individual are suppressed.

Individual in front of an authority cannot express anger and has to hold in the angry feelings which have lethal affects upon body. Anger-out is the frequency with which a person expresses angry feelings toward other people or objects in the environment in the forms of verbal or aggressive behavior. Anger- control measures the frequency of attempting to control the expression of anger by an individual. It is the tendency of an individual to prevent anger experience even passing through angry situation. Finally anger- expression is an index of anger-in anger-out and Anger-control in which a person expresses and controls anger. It reflects either the intensity of feeling or the frequency with which it is expressed (Sinclair Czech Joyner and Munkasy 2006).

According to Schlomann and Schmitke (2007) high blood pressure is the most common cause of hospital visits which means throwing away one's precious capital and time. Pakistan is a developing country where sources to earn livelihood are meager and prevalence of hypertension is 26% (Safdar et al. 2004). Grimsrud et al. (2009) examined that about 79% hypertensive patients also experience one chronic disease co-morbid with hypertension. Literature provides sufficient evidence that hypertension is a vital risk factor for many lethal diseases like heart problems renal disease loss of vision diabetes rheumatism etc. (Kannel 2000).

There is research evidence that hypertensive men and women are different in the expression of anger. It is important to observe that gender differences in the expression of anger have been reported but these differences are related to the expression of anger and not with the frequency of anger expression (Spielberger Krasner and Solomon 1988). It is observed that men score high on anger-out whereas women attain more scores on anger-suppression and anger-control which suggests that female role characteristics are related with anger- suppression and male role characteristics are related with outwardly expressing anger (Kopper and Epperson 1996). It is reported that anger expression is strongly related to increase in blood pressure reactivity in men whereas controlling anger is related to higher blood pressure reactivity in women (Shapiro Jamner and Goldstein 1993).

In another investigation on gender-related differences in cardiovascular reactivity and the role of anger inhibition as a risk of future hypertension it was concluded that there is more cardiovascular reactivity in men than in women during the state of anger (Vogele Jarvis and Cheeseman 1997). Within the male group a combination of hypertension risk and anger-in led to the highest reactivity whereas in female participants anger-in had no effect on reactivity. High anger level among hypertensive women have been reported by Steele and McGarvey (1997). The researchers also report that women less than or equal to 40 years of age have a high tendency of anger expression and the children of parents with hypertension who were suffering from high rate on two measures of blood pressure. They also had high scores on trait-anger anger out and submissiveness.

Anger as a Psychological Risk Factor of Hypertension

Thus it may be concluded that anger is equally prevalent not only in men but also in women and children of parents with hypertension. In a recent study anger-in was found to be more prevalent in men than in women (Doster Purdum Martin Goven and Moorefield 2009).

Burgeoning literature on the subject reports that control of hypertension disease in Pakistan has partial success (Jafar Chaturvedi and Pappas 2006). Inadequate data is on hands regarding anger as a risk factor of hypertension within the indigenous population. Information obtained from some researches carried out on indigenous population is restricted to stress anxiety depression and hostility as risk factors of hypertension (Mushtaq and Najam 2014) or biological factors only (Vaillant and Gerber 1996). Additionally it is a matter of concern for researchers that established risk factors in many cases do not completely determine hypertension. Notwithstanding the reality that hypertension was diagnosed many years earlier in South Asia no study was conducted to identify the risk factors associated with hypertension. In Pakistan studies have hardly thrown light on the early onset of hypertension.

Furthermore the awareness of threatening factors of hypertension has been greatly derived from data provided by developed countries; nevertheless the expression or suppression of anger may vary from country to country due to cultural factors. Investigators are doubtful about the findings obtained from European societies and their application in rest of the world is questionable. In Pakistan especially this phenomenon has rarely been studied and researches conducted in this area are based upon the data drawn from lower masses only (Jafar et al. 2006).

Regardless of its significance psychological aspects of hypertension have been ignored by researchers. Hereditary and biological factors of hypertension have always been over-emphasized by physicians and medical specialists but the role of anger as a psychological risk factor have been ignored in Pakistan. Therefore the current research would be the first and unique one to investigate the relationship between components of anger and hypertension among Pakistani men and women belonging to middle class. Studying the prevalence of anger among hypertensive men and women and its predictive role in hypertension are the main objectives of present research.

Previous research data related to the subject provides the evidence of researches using only correlational design by employing participants with hypertensive only. However case control research design was employed in the present research to compare both groups on all dimensions of anger which is considered a standardized method for studies (Sparrenberger et al. 2009). The following hypotheses were formulated keeping in view the objectives of the study.

Hypotheses

1. There is positive relationship between components of anger and hypertension.
2. Key components of anger are the positive predictors of hypertension.
3. Men with hypertension experience more anger on all components of anger than women with hypertension.

Method

Participants

The data (N = 237) were collected outdoor departments of public hospitals from the two major public hospitals by using purposive sampling technique.

Inclusion criteria for hypertensive patients was (a) participants who had the confirmed diagnosis of hypertension; (b) who had been currently taking medicines for hypertension; (c) who were able to read and write Urdu language; and (d) patients who were not suffering from any terminal illness or chronic disease including renal disease cancer coronary heart disease liver disease and history of any psychiatric diagnosis or psychiatric medication and pregnant women with high blood pressure complaints.

Non-hypertensive group was matched to every case of hypertension for age (up to 3 years older and younger) gender monthly income and working hours. Non-hypertensive group was taken from the hospitals. (a) They were not the siblings children or parents of the cases diagnosed with hypertension; (b) they were not diagnosed with

Anger as a Psychological Risk Factor of Hypertension

hypertension; and (c) with no past or current family history of hypertension were included in the non-hypertensive group.

Sample characteristics of hypertensive patients. Age range of hypertensive patients was from 30 to 65 years ($M = 45$; $SD = 8.37$). Their monthly income was ranged from Rs. 15000 to 85000 ($M = 28219$; $SD = 14440.91$). Their monthly expenditures ranged from Rs. 15000 to 85000 ($M = 40212$ $SD = 16523$). The weight of the hypertensive patients ranged from 56 to 100 kg ($M = 83$; $SD = 9.83$) and their height ranged from 4.08 to 6.08 feet ($M = 5.39$; $SD = .29$). The working hours of the respondents were ranged from 1 to 20 hours ($M = 10.77$; $SD = 4.08$).

Sample characteristics of non-hypertensive control group. The age range of cases controls (non-hypertensive group) was from 30 to 65 years ($M = 46$; $SD = 8.86$). The monthly expenditures of the participants were ranged from Rs. 17000 to 83000 ($M = 29190$; $SD = 14821.87$). Their monthly expenditures ranged from Rs. 15055 to 87500 ($M = 30415$ $SD = 15527$). The weight of the case controls was ranged from 56 to 100 kg ($M = 74$; $SD = 8.13$) and their height ranged from 5.03 to 6.10 feet ($M = 5.65$; $SD = .35$). The working hours of the cases controls were ranged from 4 to 17 hours ($M = 7.89$; $SD = 3.12$).

Table 1 Demographic Characteristics of the Sample (N=237)

Demographic Variables	Hypertensive (n = 137)		Non-hypertensive (n = 100)	
	f	%	f	%
Gender				
Males	77	56	50	50
Females	60	44	50	50
Education				
Up to matric	70	51	53	53
Up to M.A/M Sc.	55	40	40	40
Up to Ph.D	12	9	7	7
Occupation				
No Job	48	35	42	42
Job	64	47	36	36
Business	12	09	15	15
Job and business	13	09	8	8
New in city				
No	50	36	83	83
Yes	87	64	17	17
Family history of hypertension				
No	16	12	90	90
Yes	121	88	10	10
Family system				
Joint	119	87	15	15
Nuclear	18	13	85	85

Instruments

Demographic Information Form. We developed a demographic information form to gather information about age education occupation number of children number of dependents monthly income monthly expenditures height and weight family history of hypertension spouse job family system hospital visits and working hours of the research participants.

State Trait-anger Expression Inventory. It was originally developed by Spielberger (1988) consisting of 44 items. The respondents can obtain scores from 44 to 76. Higher scores show higher level of anger in all cases. 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. State-anger and Trait-anger subscales contain 10 items each. Anger-in Anger-Out and Anger-control contain 8 items each. Anger-expression is an overall index of anger-in anger-out and anger-control. Each item has four response categories representing 4-point Likert scale ranging from 1 (never) to 4 (very often). Spielberger reported that State Trait- anger Expression Inventory (STAXI) has high internal consistency with Cronbach's $\alpha = .95$. Urdu version was prepared by the researcher and used in the present research (Mushtaq 2012).

Anger as a Psychological Risk Factor of Hypertension

Procedure

Permission was obtained from administration of two public hospitals for data collection and from author of the scale. Consent from the participants suffering from hypertension and healthy controls was sought to participate in present study. Initially rapport was established by assuring them about the discretion of their personal information and that it would be used for research purpose only. Before administration of Urdu version of STAXI (1988) participants were briefed about the nature and purpose of the study. A demographic information form and STAXI were individually administered to all research participants.

Total 300 individuals were approached and 237 gave their consent to take part in the research. Participants were not given monetary compensation for their participation. They were only verbally told the likely benefits the research would impart to the society and may be the future generations could be saved from becoming hypertensive. Many patients who initially refused to participate in the research after this brief description got ready to take part. Many participants were eager to know their scores on components of anger which was provided to them by making individual telephone calls. The sample was drawn from outdoors of hospitals.

Results

Descriptive statistics was used to calculate the preliminary profile of the sample characteristics. Mantel Haenzel Test of Linear Association (MHTLA) was run to explore the relationship between components of anger and hypertension. Binary Logistic Regression Models were used to identify subscales of anger as predictors of hypertension. Independent sample t-test was employed to examine differences on anger subscales between hypertensive men and women.

Relationship between Anger and Hypertension

MHTLA was applied for exploring the relationship between different measures of STAXI and hypertension. If the exposure variable is ordinal the ordinary chi-square test does not take into account the inherent order among the categories. It hardly checks the overall departure of observed from expected across the cells of the table. A test of linear association (Pearson Chi-square) between columns and rows will be statistically insufficient because it fails to distinguish between one and two category differences (Hanif Ahmed and Ahmed 2006). MHTLA is considered statistically more powerful test which gives smaller p-value if the relationship is significant as compared to Chi-Square test. In case of categorical outcome variable it has been observed that MHTLA provides better results than Chi-square Test of Association.

Table 2 Relationship between Subscales of Anger and Hypertension (N = 237)

Variables	No of items		M	SD	2 MH
State-anger	10	.94	15.19	6.31	81.79
Trait-anger	10	.74	20.17	8.46	75.05
Anger-in	8	.87	16.77	7.84	101.36
Anger-out	8	.71	14.58	5.29	-24.83
Anger-control	8	.81	19.63	8.41	67.44
Anger expression	-	-	15.19	8.32	.77
Total anger	44	.80	104.50	38.30	147.35

The chi-square values of Mantel Haenzel Linear Association given in Table 2 indicate that State-anger trait-anger Anger-in Anger-control and total Anger are significantly positively correlated with hypertension whereas Anger-Out is negatively correlated with hypertension but relationship is statistically non-significant.

Predictors of Hypertension

A logistic regression analysis was carried out to find the subscales of anger as predictors of hypertension which included State-anger Trait-anger Anger-in Anger-control and Anger. Hypertension was taken as dependent variable and dichotomized into two groups based upon their being hypertensive or not hypertensive and were coded as: Non-hypertensive = 0 and hypertensive = 1. Anger and its subscales were taken as independent and ordinal variables.

Anger as a Psychological Risk Factor of Hypertension

Table 3 Logistic Regression Analysis to Examine Components of Anger as Risk Factors (predictors) of Hypertension (N = 237)

Variable	B	S.E	Wald	p	95% CI	
					LL	UL
Constant	-3.38	.97				
State-anger	.24	.07	10.35	.001	1.09	1.47
Trait-anger	.15	.06	5.69	.017	1.02	1.32
Anger-in	.17	.05	9.54	.002	1.06	1.33
Anger-control	.14	.04	8.46	.035	1.00	1.21
Anger	.61	.19	10.55	.001	1.27	2.69

The prediction value of $R^2 = 55.23$ in Table 3 shows that model is adequately fit and anger and its subscales are contributing 55.23 % in the hypertension disease. The odds ratio for State-anger is 1.27 and coefficient is positive. Therefore as the State-anger increases by one scale unit chances of hypertension in a person increased 1.27 times. The odds ratio for Trait-anger is 1.16 and coefficient is positive so each unit increase in the scores of Trait-anger is associated with the odds of hypertension increase by a factor of 1.16. The odds ratio for Anger-in is 1.19 and coefficient is positive consequently as the Anger-in increases by one scale unit chances of hypertension in a person is increased 1.19 times. The odds ratio for Anger-control is 1.10 and coefficient in positive. So each unit increase in the scores of Anger-control is associated with the odds of hypertension increase by a factor of 1.10.

The odds ratio for Anger is 1.85 and the coefficient is positive therefore as the Anger increases by one scale unit chances of hypertension in an individual is increased 1.85 times. Thus State- anger Trait-anger Anger-in Anger-control and Anger are significantly predicting hypertension progression.

Gender Differences on Anger

To measure gender differences in anger among hypertensive group Independent sample t-test was computed.

Table 4 Mean Scores and Standard Deviations for STAXI between Hypertensive Men and Women (N=137)

Variables	Men (n = 77)	Women (n = 60)	t(135)	Cohen's d	95% CI	
	M(SD)	M(SD)			LL	UL
State-anger	21.90(5.45)	13.76(4.82)	9.11	1.56	6.37	9.91
Trait-anger	17.70(5.84)	29.33(5.91)	11.47	1.97	9.63	13.64
Anger in	25.77(5.76)	15.21(3.18)	12.75	2.19	8.92	12.20
Anger out	14.51(5.02)	10.98(3.15)	3.98	.68	1.61	4.79
A/CON	17.98(4.02)	27.75(5.06)	12.58	2.16	8.23	11.30
A/X	28.54(7.02)	24.55(5.87)	3.54	.60	1.76	6.22
Anger	147.84(17.57)	100.53(20.30)	14.60	2.51	40.90	53.71

As shown in the Table 4 gender differences in mean scores for State-anger Trait-anger Anger-in Anger-Out Anger-Expression and Anger are statistically significant. Men express more State-anger Anger-in Anger-Out Anger-Expression and Anger as compared to women. Women exhibit higher levels of Trait-anger and Anger- control than men. The values of Cohen's d indicate that Anger-in and Anger have larger affect on hypertensive men as compared to hypertensive women whereas Anger-control has greater affect on hypertensive women than hypertensive men.

Discussion

The present study has sought the relationship of anger with hypertension. The results indicate the relationship of hypertension with State-anger Trait-anger Anger-in Anger-control and Anger is statistically significant.

Further present research showed that state-anger is significantly correlated and predicts hypertension. Gupta Joshi Mohan Reddy and Yusuf (2008) elaborate the factors which lead angry individual towards developing hypertension. Those factors are irrational perceptions of reality and four types of thinking styles which are emotional reasoning (emotional misinterpreting normal events and tend to become irritated) low frustration tolerance unreasonable expectations and evaluations of other people. The external factors of anger include verbal abuses attack one's ideas threat to one's needs and frustrations. Other causes of anger are frustration disappointment and feelings of

Anger as a Psychological Risk Factor of Hypertension

powerlessness unfulfilled expectations annoyance harassment and rejection. Thus it can be concluded that low frustration tolerance and external factors leads them immediately to enrage or become furious in present situation experiencing state- anger.

This finding is corroborated with other researches conducted in Europe which conclude that hypertensive patients experience more state-anger than normal individuals (Everson Goldberg Kaplan Julkunen and Salonen 1997; Porter Stone and Schwartz 1999). It is also observed that individuals with state-anger experience intense anger which may be expressed as a wish to yell at others or to break things. According to Spielberger (1988) during this state of anger there is moderate to severe activation in the sympathetic nervous system of the individuals. We may conclude that due to this activation of autonomous nervous system they immediately get enraged. These individuals are impulsive in reaction to anger provoking situations.

The finding further supported the hypothesis that trait-anger is statistically significant in hypertensive patients and predicts hypertension. Trait-anger is defined in terms of variation from person to person in the frequency of occurrence that state-anger is experienced occasionally. Trait-anger can rightly be called intense fury with greater frequency of occurrence and the individuals with this trait might easily become victims of hypertension (Spielberger 1988). This result coincides with previous researches which have stated that trait-anger in adults was associated with increased risk of developing hypertension. By and large trait-anger assesses an individual's general personality predisposition to become furious easily. It is manifested among individuals who have overall confrontational or argumentative personality makeup.

According to Spielberger (1988) if individual thinks that he/she is mistreated by others or criticized by others he/she is experiencing trait-anger. Hypertension predicted by trait-anger is also reported by earlier finding (Williams et al. 2002).

Furthermore the results reveal that anger-in or anger suppression is statistically significant in hypertensive patients and anger-in also predicts hypertension. If the individual holds in or suppress anger when passing through resentful situation it is called anger-in. Hypertensive patients cannot express their anger related impulses in a healthy way rather they try to suppress these impulses. There is sufficient empirical evidence which suggest that anger suppression is significantly related with hypertension (Cottingham Matthews Talbott and Kuller 1986; Ghosh and Sharma 1998; Pickering 2007; Schneider Egan Johnson Dronby and Julius. 1986; Vogeles et al. 1997; Webb and Beckstead 2001). Moreover strong association of anger suppression with hypertension has been found by previous researches (Alexander 1939; Pickering 2007; Rutelage and Hogan 2002).

There is widespread uniformity in the results drawn by researches all over the world that psychological anger is responsible for developing hypertension (Everson et al. 1997; Player et al. 2007).

The findings from an earlier study argued that the hypertension is an emotional disease and many psychological variables especially anger control is a major factor in developing hypertension (Rosen and Gregory 1965). This explanation is in accordance with state and trait theory presented by Spielberger (2005) which states that hypertensive individuals possess trait-anger and wants to express it however due to some reasons they could not express their anger and are forced to control it. This suppressing of anger or anger control leads reactivity in their nervous system which ultimately causes different diseases one of them is hypertension. Earlier in 1939 Alexander explains that controlling anger would result in increase in blood pressure and cause hypertension to develop.

The current results further suggest statistically significant differences on different components of state-anger trait-anger anger- in anger-out anger-control anger- expression and anger as reported by hypertensive men and women. It has been noticed that the hypertensive men reported more anger than hypertensive women in the current research project. This research finding is corroborative with the Matthews et al. (2004) that delineated the incidence of significantly more anger in men. Therefore the difference on psychological anger between men and women was statistically significant. It is worldwide established that anger is a strong risk factor of hypertension in men than in women (Chida and Steptoe 2009). In a research anger-in was significantly found in men as compared to women (Harburg Julius Kaciroti Gleiberman and Schork 2003). Trait-anger was found to be more prevalent among women in the present research.

Anger as a Psychological Risk Factor of Hypertension

It is also globally established that women express more trait-anger as compared to men (Raikkonen Matthews Flory and Owens 1999). Furthermore men in the present research obtained high scores on state-anger and anger-out that corroborates with previous researches (Spielberger et al. 1988). In fact a close relationship exists between trait-anger and anger. Trait-anger and anger-control are found more significantly associated with women as compared to men coincides with early findings (Spielberger Reheiser and Sydeman 1995).

Limitations and Suggestions

The main limitation of the current research was that the present study was carried out with a small sample which may not be considered exact representative of entire hypertensive population. It may be a threat to the external validity of this research. Another main limitation was that BMI was not calculated in the present research. BMI could have given more comprehensive results regarding the role of physical conditions in developing hypertension. Another limitation of the current research was the use of self-report scales which might have resulted in under reporting or over reporting due to the nature of the disease they were suffering from. Therefore it is recommended that in future researches focus group and interview techniques must also be conducted in addition to self-report questionnaires to gather more wide-ranging information about the degree and nature of anger assessment among men and women hypertensive patients.

Moderating role of gender in the relationship between anger and hypertension is also strongly recommended to examine in future researches.

Implications

The investigation regarding role of anger in developing hypertension is an important area of the present research. The early identification of anger and its suppression in developing hypertension in America has yielded some promising results in treating it. The results can be highlighted through media and public health awareness programs. Understanding the psychological causes of hypertension could open up lines of scientific inquiry and to investigate the heterogeneity of outcome when measured across multiple dimensions of anger.

The findings of this research have implications for promoting our understanding regarding role of anger as a major predictor of hypertension in Pakistani population in order to introduce effective preventive measures and to reduce the prevalence of hypertension.

References

- Alexander F. (1939). Psychoanalytic study of a case of essential hypertension. *Psychosomatic Medicine* 1 139-152.
- Barcelo A. (2000). Diabetes and hypertension in the Americas. *West Indian Med Journal* 49 262-265.
- Borde-Perry W. C. Campbell K. L. Murtaugh K. H. Gidding S. and Falkner B. (2002). The association between hypertension and other cardiovascular risk factors in young adult African Americans. *Journal of Clinical Hypertension* 4(1) 17-22.
- Borteyrou X. Bruchon-Schweitzer M. and Spielberger C. D. (2008). The French adaptation of the STAXI-2 C.D. Spielberger's State-trait-anger expression inventory. *Encephale* 34(3) 249-55.
- Chida Y. and Steptoe A. (2009). Association of hostility and anger with future coronary heart disease: A meta analytic review of prospective evidence. *Journal of American College Cardiology* 53 936-946.
- Cottingham E. M. Matthews K. A. Talbott E. and Kuller L. H. (1986). Occupational stress suppressed anger and hypertension. *Psychosomatic Medicine* 48(3) 249-260.
- Doster J. A Purdum M. B. Martin L. A. Goven A. J. and Moorefield R. (2009). Gender differences anger expression and cardiovascular risk. *The Journal of Nervous and Mental Disease* 197(7) 552-4. doi: 10.1097/NMD.0b013e3181a81b.

Anger as a Psychological Risk Factor of Hypertension

- Everson S. A. Goldberg D. E. Kaplan G. A. Julkunen J. and Salonen T. (1997). Anger expression and incident hypertension. *Hypertension* 35(2) 561-570.
- Gerin W. Davidson K. W. Nicholas Christenfeld J. S. Goyal T. and Schwartz J. E. (2006). The role of angry rumination and distraction in blood pressure recovery from emotional arousal. *Psychosomatic Medicine* 68 64-72.
- Ghosh S. N. and Sharma S. (1998). Trait anxiety and anger expression in patients with essential hypertension. *Journal of the Indian Academy of Applied Psychology* 24(1-2) 9-14.
- Grimsrud A. Stein D. J. Seedat S. Williams D. and Myer L. (2009). The association between hypertension depression and anxiety disorders: Results from a nationally-representative sample of South African adults. *South African Medical Journal* 99 4(5) 358-366.
- Gupta R. Joshi P. Mohan V. Reddy K. S. and Yusuf S. (2008). Global burden of cardiovascular disease: Epidemiology and causation of coronary heart disease and stroke in India. *Heart* 94 16-26.
- Hanif M. Ahmed M. and Ahmed A. M. (2006). Biostatistics for health students with manual on software applications. Islamic Society of Statistical Sciences. Lahore: An ISOSS publication.
- Harburg E. Julius M. Kaciroti N. Gleiberman L. and Schork M. (2003). Expressive/suppressive anger coping responses gender type and mortality: A 17 year follow-up (Tecumseh Michigan 1971-88). *Psychosomatic Medicine* 65(4) 588-97. doi:10.1097/01.PSY.00000 75974.19706.3B
- Jafar T. H. Chaturvedi N. and Pappas G. (2006). Prevalence of overweight and obesity and their association with hypertension and diabetes mellitus in an Indo-Asian population. *Canadian Medical Association Journal* 175 1071-1077. doi:10.1503/cmaj.060464
- Kannel W. B. (2000). Risk stratification in hypertension: New insights from the Framingham Study. *American Journal of Hypertension* 13(1-2) 3-10.
- Kopper B. A. and Epperson D. L. (1996). The experience and expression of anger: Relationship with gender gender role socialization depression and mental health functioning. *Journal of Counseling Psychology* 43 158-165.
- Landesbergis P. A. Schnoall P. L. Warren K. Pickering T. G. and Schwartz J. E. (1994). Association between ambulatory blood pressure and alternative formulations of job strain. *Scandinavian Journal of Work Environmental Health* 20 349-363.
- Light K. C. (2001). Hypertension and the reactivity hypothesis: The next generation. *Psychosomatic Medicine* 63(5) 744-6.
- Matthews K. A. Katholi C. R. McGreath H. Whooly M. A. Williams D. R. Zhu S. et al. (2004). Blood pressure reactivity to psychological stress predicts hypertension in the ***Cardia study***. *Circulation* 110 74-78
- Mushtaq M. (2012). Psychological risk factors and coping strategies used by patients with hypertension. (Unpublished doctoral dissertation). University of the Punjab Lahore.
- Mushtaq M. and Najam N. (2014). Psychological distress and components of anger: Predictors of hypertension development. *Science Journal of Psychology* 175 1-4. doi: 10.7237/sjpsych/175.
- Nishter S. (2001). The cardiovascular disease situation in Pakistan.
- Heartfile Newsletter. Retrieved from <http://www.heartfile.org/pdf/Essentialdrugs.pdf>.

Anger as a Psychological Risk Factor of Hypertension

Pickering T. G. (2007). Mental stress as a causal factor in the development of hypertension and cardiovascular disease. *Journal of Current Hypertension* 3(3) 249-254.

Player M. S. King D. E. Mainous A. G. and Geesey M. A. (2007).

Psychological factors and progression from pre-hypertension to hypertension or coronary heart disease. *Annals of Family Medicine* 5 403-411.

Porter L. S. Stone A. A. and Schwartz J. E. (1999). Anger expression and ambulatory blood pressure: A comparison of state and trait measures. *Psychosomatic Medicine* 61 454-463.

Raikkonen K. Matthews K A. Flory J. D. and Owens J. F. (1999). Effects of hostility on ambulatory blood pressure and mood during daily living in healthy adults. *Health Psychology* 18(1) 44-53.

Rosen E. and Gregory I. (1965). *Abnormal psychology*. Tokyo: Toppan Company Limited.

Rutelage T. and Hogan B. E. (2002). A quantitative review of prospective evidence linking psychological factors with hypertension development. *Psychosomatic Medicine* 64 758-766.

Safdar S. Omair A. Faisal U. and Hasan H. (2004). Prevalence of hypertension in a low income settlement of Karachi Pakistan. *Journal of Pakistan Medical Association* 54 506-512.

Schlomann P. and Schmitke J. (2007). Lay beliefs about hypertension: An interpretive synthesis of the quality research. *Journal of American Academy of Nurse Practitioners* 19(7) 358-367.

Schneider R. H. Egan B. M. Johnson E. Dronby H. and Julius S. (1986).

Anger and anxiety in borderline hypertension. *Psychosomatic Medicine* 48(3) 242-248.

Shah S. M. Luby S. Rahbar M. Khan A.W. and McCormick J. B. (2001).

Hypertension and its determinants among adults in high mountain villages of the Northern areas of Pakistan. *Journal of Human Hypertension* 15(2) 107-12.

Shapiro D. Jamner L. D. and Goldstein I. B. (1993). Ambulatory stress psychophysiology: The study of compensatory and defensive counter forces and conflict in a natural setting. *Psychosomatic Medicine* 55 309- 323.

Sinclair J. Czech D. R. Joyner A. B. and Munkasy B. A. (2006). An exploration of state and trait-anger anger expression and perfectionism in collegiate springboard divers. *The Sport Journal* 9(2). Retrieved from <http://www.thesportjournal.org/article/exploration-state-and-trait-anger-a-collegiate-springboard-> [Feb10 2009] nger-expression-and-perfectionism-

Sparrenberger F. Cichelero F. T. Ascol A. M. Fonseca F. P. Weiss G. Berwange . . . Fuchs F. D. (2009). Does psychosocial stress cause hypertension A systematic review of observational studies. *Journal of Human Hypertension* 23(1) 12-9. doi: 10.1038/jhh.2008.74.

Spielberger C. D. (2005). State-Trait-anger Expression Inventory-2 (STAXI-2 Measure the experience expression and control of anger in ages 16 years and older. Retrieved from <http://www3.parinc.com/products/product.aspxProductid=STAXI-2>

Spielberger C. D. (1988). *Manual for the State Trait Anger Expression*

Inventory (STAXI). Odessa FL: Psychological Assessment Resources Inc.

Spielberger C. D. Jacobs G. Russell S. and Crane R. (1983). Assessment of anger: The State-Trait Anger Scale. In: Butcher J. N. and Spielberger C. D. (1983). *Advances in Personality Assessment* (vol. 2) (pp. 161-189). Hillsdale NJ: Lawrence Erlbaum.

Anger as a Psychological Risk Factor of Hypertension

Spielberger C. D. Krasner S. and Solomon E. (1988). The experience expression and control of anger. In M. P. Janisse (Ed.). *Health psychology: Individual differences and stress*. New York: Springer.

Spielberger C. D. Reheiser E. C. Sydeman S. J. (1995). Measuring the experience expression and control of anger. In: H. Kassinove Editor (1995). *Anger disorders: Definition diagnosis and treatment* (pp. 49-67). Washington DC: Taylor and Francis.

Steele M. S. and McGarvey S. T. (1997). Anger expression age and blood pressure in modernizing Samoan adults. *Psychosomatic Medicine* 59(6) 632-637.

Vaillant G. E. and Gerber P. D. (1996). Natural history of male psychological health XIII: Who develops high blood pressure and who responds to treatment *American Journal of Psychiatry* 153 24-29.

VAlgele C. Jarvis A. and Cheeseman K. (1997). Anger suppression reactivity and hypertension risk: Gender makes a difference. *Annals of Behavioral Medicine* 19(1) 61-69.

Webb M. S. and Beckstead J. (2001). Hypertension in African American women: Influence of anger expression style. *American Journal of Hypertension* 14 692-696.

Williams J. E. Nieto F. J. Sanford C. P. Couper D. J. and Tyroler H. A. (2002). The association between trait-anger and incident stroke risk: The atherosclerosis risk in communities (ARIC) study. *Stroke* 33 13-20.

Classification

Language: ENGLISH

Publication-Type: Journal

Subject: HYPERTENSION (95%); CARDIOVASCULAR DISEASE (90%); DISEASES & DISORDERS (78%); CHRONIC DISEASES (77%); LIFE EXPECTANCY (76%); MEN'S HEALTH (76%); POPULATION & DEMOGRAPHICS (74%); STATISTICAL METHOD (72%)

Industry: HOSPITALS (71%)

Geographic: KARACHI,PAKISTAN (54%); PAKISTAN (92%); Pakistan

Load-Date: October 29, 2014