

# THE RELATIONSHIP OF BLOOD PRESSURE TO A BRIEF MEASURE OF ANGER DURING ROUTINE HEALTH SCREENING

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**A brief questionnaire (12 items) was developed to assess aspects of anger that could be expeditiously obtained during health screenings where medical students and residents can acquire valuable research and clinical experience simultaneously. Blood pressures were measured immediately upon sitting and after 3 minutes in 179 subjects who attended a health fair in Nashville. The questionnaire was administered after both blood pressure measurements were acquired. Scores on the measure of anger correlated significantly ( $P = .0009$ ) with resting systolic blood pressure (SBP) in both blacks and whites while a measure of "John Henryism" showed no correlation with blood pressure in either group ( $P = .81$ ). The findings are consistent with the literature in supporting a connection between anger and blood pressure but do not support the relationship between John Henryism and blood pressure. (*J Natl Med Assoc.* 1991;83:601-604.)**

**Key words** • anger • systolic blood pressure  
• diastolic blood pressure • John Henryism  
• coronary heart disease

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The relationship between psychological factors and cardiovascular disease has been of interest to medical scientists for decades if not centuries.<sup>1</sup> Only recently, however, has the problem been approached with empirical investigations. A popular focus has been on the vulnerability of Type-A individuals to coronary heart disease (CHD),<sup>2</sup> but equivocal findings from recent studies raise new questions about the validity of this relationship.<sup>3,4</sup> Furthermore, the concept of hostility has been found to be a critical ingredient of the Type-A behavior pattern, and some evidence suggests that anger and hostility might very well be stronger independent determinants of CHD<sup>5,6</sup> than the overall Type-A behavior pattern, which includes sensitivity to time pressures, competitiveness, and excessive job involvement.

Several investigations have found significant relationships between anger, blood pressure, and essential hypertension, but the methods for assessing anger have been inconsistent and often time consuming to subjects. Dimsdale and colleagues<sup>7</sup> used a brief questionnaire requesting a choice of three potential reactions to each of two contrived anger-provoking situations. Their subjects were clients of a state unemployment agency who were waiting for one of their regular appointments. Interestingly, they found a strong relationship between suppressed anger and systolic blood pressure (SBP). The relationship was statistically significant for white men but not for women and black men. There was no relationship between measure of anger and diastolic blood pressure (DBP).

In other studies, Chesney et al<sup>8</sup> and Gentry<sup>9</sup> found

Please circle the number that reflects the amount of your agreement or disagreement with each statement. Thank you for your cooperation.

1. Some things people do are unforgiveable.	0	1	2	3	4	5	6
Strongly Disagree							Strongly Agree
2. I was frequently teased as a child.	0	1	2	3	4	5	6
Strongly Disagree							Strongly Agree
3. I usually express anger as soon as I feel it.	0	1	2	3	4	5	6
Strongly Disagree							Strongly Agree
4. There is a person (or persons) who has given me reason to be angry for the rest of my life.	0	1	2	3	4	5	6
Strongly Disagree							Strongly Agree
5. Once you really fall in love with someone, you'll always be in love with that person, no matter what happens.	0	1	2	3	4	5	6
Strongly Disagree							Strongly Agree
6. I find it difficult to control my temper.	0	1	2	3	4	5	6
Strongly Disagree							Strongly Agree
7. When I am wronged, it is important for me to "get even."	0	1	2	3	4	5	6
Strongly Disagree							Strongly Agree
8. Neither of my parents ever gave me reason to be angry.	0	1	2	3	4	5	6
Strongly Disagree							Strongly Agree
9. I enjoy watching professional wrestling on TV.	0	1	2	3	4	5	6
Strongly Disagree							Strongly Agree
10. There were a lot of arguments in the house where I grew up.	0	1	2	3	4	5	6
Strongly Disagree							Strongly Agree
11. Drug addicts and homosexuals who get AIDS have gotten what they deserve.	0	1	2	3	4	5	6
Strongly Disagree							Strongly Agree
12. As a child I received many more spankings than I deserved.	0	1	2	3	4	5	6
Strongly Disagree							Strongly Agree

**Figure. Meharry Brief Anger Questionnaire.**

that blacks and whites who report more job strain and who suppress their anger have a higher DBP than those who do not. Johnson and Broman<sup>10</sup> found that blacks indicating a high level of outwardly expressed anger during a period in which they experienced a severe personal problem had significantly more health prob-

lems than those who did not report such anger. Hypertension was one of the health problems they found more frequently among those with high outward expression of anger, but their findings about health problems in general held up even when they factored out the incidence of hypertension.

Normally, the measurement of behavioral or psychological factors is time consuming and does not lend itself to research in settings where there are limitations on the time subjects are willing to contribute gratis. For example, the Cook-Medley measure of anger, which has been used productively in research with CHD, consists of 50 true-false items from the Minnesota Multiphasic Personality Inventory (MMPI) and requires 15 to 20 minutes for administration and perhaps longer if comprehension or reading levels are less than average. On the other hand, the John Henryism questionnaire developed by James et al<sup>11</sup> is a particularly succinct instrument easily employed in research situations in which access time of research subjects is limited. James et al have demonstrated consistent positive correlations of blood pressure with their measure of John Henryism (a type of overcompensating coping style).<sup>11,12</sup>

We hoped to develop a method for investigating behavioral factors and cardiovascular function that could be employed with minimal obtrusiveness in health screenings where medical students and residents could obtain meaningful experience with both research and clinical methodologies. Our intentions were to develop a brief (one page) questionnaire that would address both the expression and suppression of anger (Figure). We reasoned that the use of a brief questionnaire would increase the reliability of responses that are elicited in a time-limited situation because the respondents would be more likely to provide serious attention to all of the questions rather than simply the first few. It was hypothesized that resting blood pressures would correlate with subjects' endorsement of items relating to the expression and suppression of anger.

## METHOD

### Subjects

Health screenings from two college and two workplace locations were used to obtain 179 volunteers who agreed to provide minimal demographic and questionnaire information. The questionnaire (Figure) was devised as a teaching exercise in survey development to create a database for an introduction to descriptive statistics. Although subjects were not compensated, participation was achieved in more than 95% of those who were asked to volunteer. The sample consisted of 88 males and 91 females, 82 blacks and 97 whites. The mean age was 29.65 ( $SD=9.79$ ).

### Procedures

Blood pressures and heart rates were collected with the use of a Dinamap Model 1846 SX/P fully automated

monitor (Critikon, Tampa, Florida). Subjects approached a blood pressure station within the health screening protocol and routinely had no waiting period. After securing the blood pressure cuff to the left arm, the monitor was triggered to obtain measurements of SBP, DBP, mean arterial pressure (MAP), and heart rate (HR) within 15 seconds of sitting and again at 3 minutes after sitting. During the 3-minute interval, subjects were asked basic demographic information. Following the second measurement of blood pressure, subjects were asked to complete two brief questionnaires requiring about 3 additional minutes of their time. The first questionnaire consisted of 12 statements with which agreement or disagreement was elicited on a 7-point Likert scale from 0 (strongly disagree) to 6 (strongly agree). Subjects were asked to circle the number corresponding to their amount of agreement or disagreement with each statement. A composite "anger" score was derived by adding all the numbers that were circled. The second questionnaire was the eight-item John Henryism questionnaire, which elicited a continuum of agreement on a 3-point Likert scale. Total scores were obtained by a simple sum of numerical responses.

## RESULTS

Descriptive statistics were applied to anger and John Henryism score totals to investigate the relationship between these measures and the cardiovascular measures. The anger questionnaire yielded scores with a range of 8 to 55 (total possible range: 0 to 72) with a mean of 27.1, median of 27, and mode of 25. The standard deviation was 8.6, and measures of skewness and kurtosis were 0.31 and 0.01, respectively.

Correlational analyses were performed using Psychostat software (Statsoft, Tulsa, Oklahoma) on an IBM-AT PC. Calculations of product-moment correlation coefficients were obtained for anger score totals and each of the cardiovascular parameters (SBP, DBP, MAP, and HR). The Table reveals that statistically significant positive correlations were found for measures of anger with SBP and with MAP. The reliability of the coefficients improves from the first to the second cardiovascular measurements for SBP and MAP but not for DBP and HR. To further assess the relationship between anger and SBP, high and low anger groups were created by a median split. Subjects above the median of 27 had an SBP mean of 125.8 mm Hg while those subjects below the median had a mean SBP of 117.2 mm Hg. The difference in SBP means between these two groups proved to be statistically very reliable ( $t=3.42$ ,  $df=84$ ,  $P=.001$ ). Identical analyses were

**TABLE. CORRELATION COEFFICIENTS AND CORRESPONDING PROBABILITY LEVELS FOR ANALYSES OF ANGER TOTAL SCORES AND TWO SETS OF RESTING CARDIOVASCULAR MEASUREMENTS ACROSS A 3-MINUTE PERIOD\***

Anger and:	Coefficient	Probability
First SBP	.17	.022
First DBP	.10	.185
First MAP	.14	.057
First HR	.09	.229
Second SBP	.25	.0009
Second DBP	.07	.346
Second MAP	.17	.025
Second HR	.08	.292

\*  $df = 177$  for each coefficient.

performed on scores from the John Henryism scale and the four cardiovascular parameters. All correlation coefficients in these analyses exceeded a  $P$  value of .50. There were also no significant racial differences in questionnaire totals and levels of correlation between the totals and cardiovascular measurements.

## DISCUSSION

A strong positive correlation was found between measures of anger and resting SBP and MAP in a group of relatively young black and white subjects. It is not clear why this relationship was particularly powerful in the case of SBP and not DBP or HR. A weaker but statistically significant relationship was also found for MAP, but this finding can be partially explained as an artifact of the SBP component of the MAP calculation. However, other studies have demonstrated a differential effect of nutritional and behavioral factors specifically on SBP,<sup>13,14</sup> including investigations in our laboratory.<sup>15-17</sup> Another possible explanation of the specificity of SBP in our findings is that anger, measured in the fashion described here, may selectively affect beta-adrenergic autonomic functioning, which is more likely to be expressed in effects on SBP than DBP. Further studies of selective autonomic mechanisms are necessary to address this problem systematically.

The role of anger has found considerable recent research support in the etiology of coronary heart disease. The present findings contribute to the growing literature providing empirical support for the potential role of anger in the etiology of hypertension as well. Considerable effort is still required to identify the specific pathways through which anger influences an elevation and a sustained elevation of blood pressure.

This investigation serves as a model for the type of

descriptive research that can be readily incorporated into graduate and undergraduate medical training to simultaneously introduce students to fundamental clinical and research methodologies.

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