

Frequency of Church Attendance and Blood Pressure Elevation¹

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Accepted for publication: October 25, 1977

Blood pressure levels were examined with regard to church attendance patterns in a group of white male heads of households who appeared in the 1967-1969 follow-up examination of the Evans County Cardiovascular Epidemiologic Study. A consistent pattern of lower systolic and diastolic blood pressures among frequent church attenders was found compared to that of infrequent attenders which was not due to the effects of age, obesity, cigarette smoking, or socioeconomic status.

KEY WORDS: religion; blood pressure; church attendance.

INTRODUCTION AND LITERATURE REVIEW

In this article, an examination is made of the relationship between one aspect of religious behavior, frequency of church attendance, and levels of systolic

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and diastolic blood pressure. In the literature many contradictory findings with regard to the relationship between denominational membership and coronary heart disease have been reported. These contradictory findings have been described in the reviews of Marks (1967), Jenkins (1971), Comstock and Partridge (1972), and Kaplan (1976), and are not surprising since denominational affiliation alone does not indicate the role of religion in the life of the individual. The members of certain denominations, however, such as Seventh Day Adventists, Christian Scientists, and Orthodox Jews, can be expected to differ in dietary or other habits which may have important health consequences.

Medalie (personal communication to B. H. Kaplan) has indicated that in a 5-year incidence study (the Israeli Ischemic Study) Orthodox Jews had an age-adjusted coronary heart disease rate of 29/1000, Traditional Jews 37/1000, and nonreligious Jews 56/1000 (infarctions). The problem of controlling for confounding factors, especially diet, however, still exists.

In Washington County, Maryland, Comstock and Partridge (1972) found several important associations between frequency of church attendance and atherosclerotic heart disease mortality for males 45-64 years of age who attended church regularly, controlling for smoking and socioeconomic status; for women ages 45-64, they found a relative risk of death from atherosclerotic heart disease over a 5-year period of 2.1 for infrequent as compared to frequent church attenders. The possibility exists, however, that these findings were the result of persons being too ill to attend church regularly.

Scotch (1963), in an examination of hypertension among the Zulu, reported a strong negative association between frequency of church attendance and hypertension for rural Zulu women and a weaker, although statistically significant, negative association between church membership and hypertension for urban Zulu women. For Zulu men, his findings were the reverse, with no association between church attendance and hypertension for rural Zulu men and a positive association between church membership and hypertension for urban Zulu men. He explained this finding for urban Zulu men by noting that church attendance was considered deviant behavior for them.

From the above brief review, it is apparent that the examination of the relationship between religious behavior and health is in its infancy. This study was undertaken in order to expand this area of knowledge, specifically with regard to blood pressure.

METHOD

The sample for this study was drawn from subjects examined during 1967-1969 as part of the Evans County Cardiovascular Epidemiologic Study. During the examination, individuals were administered a sociological questionnaire which included items concerning extent of religious involvement.

The sample examined here consists of all white male heads of households who were free of diagnosable CHD between the 1960-1962 prevalence study and the 1967-1969 follow-up, who were not taking medication for heart or circulation disorders, who had not been told by a physician that they had hypertension, and for whom responses to the items on the sociological questionnaire concerning church attendance were recorded.

The above selection criteria were chosen for a number of reasons. Time limitations and the relatively large size of the group were the reasons for selecting white males over any other race-sex group. Heads of households were chosen to eliminate heterogeneity with regard to social role and responsibilities. Freedom from diagnosable CHD, not being told that one was hypertensive, and not being on medication for heart or circulation disorders were selection criteria because any of these things could be expected to affect church attendance patterns. These selection criteria reduced the overall variation in blood pressure (which was undesirable), but it was felt that this also reduced the likelihood that any association between church attendance and blood pressure reported here was due to the extraneous associations described above. The application of these selection criteria yielded a sample of 355 white male heads of households.

RESULTS

As part of the Evans County Study, race, sex, and age-standardized systolic and diastolic blood pressure scores were calculated by the *Z*-score method across 5-year age bands for all individuals appearing in the 1967-1969 follow-up. In our study, differences in mean age-standardized blood pressure scores rather than hypertension prevalence rates were examined to avoid the confounding effects of age and to avoid possible loss of information as a result of dichotomizing individuals into hypertensive vs. normotensive groups. Also, evidence from other studies indicates that the pathological effects of blood pressure elevation are more or less continuous.

Frequency of church attendance was examined in terms of two categories: frequent church attenders (one or more times per week) and infrequent church attenders (less than once per week). This dichotomy was chosen because it assures comparability with the work of Comstock and Partridge (1972) and because it was felt that this cut point best differentiates the hard core of individuals with strong religious commitment from those for whom religion is of less importance.

Body mass, a known confounder in blood pressure studies, including those conducted in Evans County (Tyroler *et al.*, 1975), was measured in terms of the Quetelet Index, which was derived from height and weight measurements taken during the follow-up examination. Cigarette smoking was considered a possible confounder and subjects were classified as cigarette smokers and non-cigarette

smokers even though a finding of no association between smoking status and systolic and diastolic blood pressure has been reported in Evans County (Greene *et al.*, 1976). This was done because many of the religions practiced there have strong proscriptions against cigarette smoking and thus frequent and infrequent church attenders could be expected to differ with regard to this behavior.

A three-division scale of socioeconomic status based on the occupation of the respondent was used to assess the effects of this potentially confounding variable. The three divisions were "white collar," "blue collar skilled," and "blue collar unskilled." Other obvious confounders such as drinking, diet, and exercise habits were not obtainable. However, socioeconomic status, as a life-style variable, is perhaps a rough proxy.

An analysis of covariance was performed to assess the variation in age-standardized systolic and diastolic blood pressure scores that could be attributed to frequency of church attendance, while Quetelet Index, cigarette smoking, and socioeconomic status were controlled for. This analysis reveals that, of the variables examined, Quetelet Index explains by far the most variation in both age-standardized systolic and diastolic blood pressure scores ($F = 22.20$, $p \leq 0.001$ for systolic and $F = 50.47$, $p \leq 0.001$ for diastolic) while neither cigarette smoking nor socioeconomic status explains a statistically significant amount of variance in either blood pressure. Of greater interest is the finding that frequency of church attendance explains a statistically significant amount of variance in systolic blood pressure scores ($F = 4.14$, $p \leq 0.05$) and an appreciable, although not statistically significant, amount of variance in diastolic blood pressure scores ($F = 2.325$, $p > 0.10$) controlling for Quetelet Index, cigarette smoking, and socioeconomic status.

On the basis of the above analysis one might conclude that categorical controls are unwarranted. However, because of the descriptive nature of this research, comparisons of blood pressure scores between frequent and infrequent church attenders were made for the entire sample, for quartiles of the Quetelet Index, for cigarette smoking categories, and for the three socioeconomic status groups. In all of these categorical comparisons, one-tailed t tests of the significance of the difference in mean age-standardized systolic and diastolic blood pressure scores between the frequent and infrequent church attender groups were performed.

For the entire sample, the frequent attender group has significantly lower mean age-standardized systolic and diastolic blood pressure scores ($t = 2.634$, $p < 0.005$ systolic and $t = 1.959$, $p < 0.05$ diastolic). Within quartiles of the Quetelet Index, the analysis revealed important differences in means blood pressure levels for frequent vs. infrequent attenders. These differences were statistically significant for systolic pressure in the first quartile (the leanest individuals $t = 1.947$, $p < 0.05$) and also the second quartile ($t = 1.682$, $p < 0.05$). For diastolic pressure, however, the differences were not statistically significant in any of the

four quartiles. This general decrease in the magnitude of differences in mean systolic pressure levels between frequent and infrequent attenders as the Quetelet Index increases is noteworthy and suggests that obesity acts as an effect modifier which reduces, although does not totally eliminate, any benefits in terms of lower systolic pressure associated with frequent church attendance.

In comparing smokers and nonsmokers, it was observed that nonsmokers outnumber smokers in the frequent attender group, while in the infrequent attender group the numbers of smokers and nonsmokers is about equal. Of greater interest, however, was the finding that, within each smoking category, frequent church attenders have significantly lower age-standardized systolic blood pressure scores ($t = 1.886$, $p < 0.05$ for smokers, $t = 1.585$, $p < 0.06$ for nonsmokers). Again, however, mean differences in diastolic pressure for smokers and nonsmokers with the two attendance groups were not significant.

The categorical analysis to control for socioeconomic status revealed similar differences for systolic pressure. That is, frequent church attenders had lower age-standardized systolic means within both the white collar ($t = 1.627$, $p < 0.06$) and blue collar skilled ($t = 1.999$, $p < 0.025$) groups. Significant differences, however, were not found in mean systolic pressure for the two attendance groups with the blue collar unskilled sample or for diastolic pressure scores in any of the socioeconomic groups. It was thought that the blue collar unskilled group might be more obese than the other two groups, thus negating the beneficial effects of frequent church attendance for these individuals; however, an analysis of the mean Quetelet Index values for the three socioeconomic status groups (white collar = 3.582, blue collar skilled = 3.613, blue collar unskilled = 3.580) revealed that this was not the case.

CONCLUSION

In the sample examined here, a consistent association between frequent church attendance and lower mean age-standardized systolic and diastolic blood pressure scores was found. This association was present for the overall sample and to some extent among smokers and nonsmokers, in two socioeconomic status groups, and in two quartiles of the Quetelet Index. Because the data examined here are cross-sectional, care must be taken in drawing any causal inferences. The consistency of the pattern, however, is undeniable and indicates the need for prospective studies using diverse sociocultural groups in this area.

In a review of the literature on religious behavior and coronary heart disease, Kaplan (1976) proposes a preliminary set of religious risk and protective behaviors as shown in Table I. Kaplan speculates on why religious attendance can be helpful to the cardiovascular system. The following religious social mech-

Table I. Preliminary Set of Religious Risk and Protective Behaviors^a

Risk behaviors	Protective behaviors
1. William James's "sick soul," promotive of excessive guilt, self-doubt, sexuality fears, anxiety over personal worth, etc.	1. Prohibitions against smoking
2. Excessive demands of the work ethic	2. Encouragement of physical fitness
3. Conflicts over systems of "meaning" and "belief"	3. Early/preventive medical care ethos
4. Conflicts over beliefs, feelings, and action	4. Regulation of excessive alcohol usage
	5. Socioemotional support
	6. Crisis resources
	7. Religious "therapy," e.g., external sources of control, counseling, belief healing
	8. Reduction of anxiety/despair through systems of "meaning" and ritual "release"

^aFrom Kaplan (1976).

anisms probably contribute to the maintenance of *hope*, the regulation of depression/fear/anxiety problems, and the protection of social-personal integration:

1. Ritual behavior – contributions to a sense of personal community and meaning, emotional "warmth," release of fear/anxiety, and a personal language of stress and healing.
2. Interpersonal provisions of support – social activities, "brothers and sisters," surrogate extended family, and crisis support.
3. Coping models – the extent to which religious teachings and models represent effective models for dealing with threat, anxiety, and despair: for example, providing predictability, models for coping with the finite and the infinite, models of ideal attachments (personal and theological), anticipatory coping skills, emergency threat management, effective information, self-esteem protection, insulation from dangerous feelings, not giving up, and hope. Above all, the maintenance of hope and the regulation of fear are probably related to a variety of arousal responses. Many of the Psalms speak of this hypothesis, for example, the 27th.

REFERENCES

- Comstock, B. W., and Partridge, K. B. (1972). Church attendance and health. *J. Chron. Dis.* 25: 665-672.
- Greene, S. B., Avedal, M. H., Tryoler, H. A., Davis, C. E., and Hames, C. G. (1977). Smoking habits and blood pressure change: A seven year follow-up. *J. Chron. Dis.* 7: 401-413.
- Jenkins, C. D. (1971). Psychologic and social precursors of coronary disease. *New Engl. J. Med.* 284: 3-23.
- Kaplan, B. H. (1976). A note on religious beliefs and coronary heart disease. *J. S. Carol. Med. Assoc. Suppl.*, pp. 60-64.

- Marks, R. (1967). Factors involving social and demographic characteristics: A review of empirical findings. *Milbank Mem. Fund Quart.* 45(2): 61-108.
- Scotch, N. A. (1963). Sociocultural factors in the epidemiology of Zulu hypertension. *Am. J. Publ. Health* 53: 1205-1213.
- Tyroler, H. A., Heyden, S., and Hames, C. G. (1975). Weight and hypertension: Evans County studies of blacks and whites. In Oglesby, P. (ed.), *Epidemiology and Control of Hypertension*, Stratton International Medical Book Corporation, New York, pp. 177-201.