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A correlational study of health beliefs and compliance with a sodium-restricted diet

Welch, Mary Ann, M.S.
The University of Arizona, 1989
A CORRELATIONAL STUDY OF HEALTH BELIEFS AND
COMPLIANCE WITH A SODIUM-RESTRICTED DIET

by

Mary Ann Welch

A Thesis Submitted to the Faculty of the
COLLEGE OF NURSING
in Partial Fulfillment of the Requirements
For the Degree of
MASTER OF SCIENCE
In the Graduate College
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1989
STATEMENT BY AUTHOR

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APPROVAL BY THESIS DIRECTOR

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7/10/89
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The relationship between health beliefs, based on the Health Beliefs Model, and compliance with a sodium-restricted diet was investigated. Significant predictors of compliance and the relationships among compliance measures were also investigated. The Health Beliefs Questionnaire was administered to a convenience sample of 30 hypertensive elderly subjects. Overnight urine chloride, questionnaire (added salt and salty foods), blood pressure, and dietary recall operationalized compliance.

No significant relationship was found between a total health beliefs score, perceived resusceptibility to hypertension, and perceived severity of hypertension and compliance. Perceived benefits of antihypertension treatment had significant relationships with urine chloride \( (r = 0.41) \) and blood pressure \( (r = 0.35) \). Age, a significant predictor, accounted for 12% of compliance. Urine chloride significantly correlated with added salt \( (r = 0.44) \), salty foods \( (r = 0.44) \), and blood pressure \( (r = 0.45) \). Barriers to a sodium-restricted diet were categorized as no control of salt in prepared foods, desire for salt, addictive behavior, and beliefs about salt.
CHAPTER ONE
OVERVIEW OF THE PROBLEM

This study examines the relationship of health beliefs and compliance with one nonpharmacological antihypertensive treatment, dietary sodium restriction. In addition, the relationships of the compliance measures, urine chloride, blood pressure, compliance questionnaire, and dietary recall, were examined to compare the validity of different types of compliance measures.

Statement of the Problem

Cardiovascular disease is the largest single cause of death in the United States. Essential hypertension (hypertension) results in the end-stage cardiovascular complications of heart disease, stroke, and kidney disease. Over 59 million Americans have high blood pressure (American Heart Association, 1988). The cost of cardiovascular disease for 1988 was estimated to be 83.7 billion dollars by the American Heart Association (1988). More important than the cost in dollars is the cost of hypertension in quality of life. Hypertension and its complications can reduce a person's ability to live independently and make lifestyle choices.

High blood pressure seems to be caused by different pathogenic mechanisms, none of which are well defined. Some theories on the cause of hypertension include neural, hormonal, and kidney physiology (Chobanian, 1983; Freis, 1976). Two factors, strongly indicated in the etiology of hypertension regardless of the exact nature of the pathophysiology, are a strong genetic tendency toward high blood pressure and a
high-salt diet (Dahl, 1954; Kannel, 1984; Page, 1976). Freis (1976) reviewed research on the role of sodium in chronic hypertension based on hemodynamic studies. He concluded that blood pressure was related to an expanded extracellular fluid (ECF) volume due to an excess of dietary sodium. "Homeostasis of the ECF is maintained by a balance between salt and water intake and urinary output" (Freis, 1976, p. 591). Whether or not the kidney can excrete enough salt and fluid to compensate for the salt-induced expanded ECF is probably related to genetic factors (Freis, 1976). In his review of literature, Houston (1985) concluded that essential hypertension results from genetic and environmental factors, one of which is excessive sodium intake. Research in animals has supported the theory that a high sodium diet can lead to chronic hypertension (Freis, 1976; Kannel, 1984).

Epidemiological studies have shown a correlation between a high dietary sodium intake and hypertension. Freis (1976) stated that essential hypertension is a disorder of acculturated peoples and is caused specifically by the acquired habit of eating salt. Although the susceptibility to hypertension is believed to be genetic, studies comparing primitive people with industrialized people suggest that the high-salt diet of the industrialized culture promotes hypertension. Hypertension is not a problem in primitive humans nor does it increase with age in primitive people as it does in people who eat a lot of salt (Dahl, 1954; Freis, 1976; Page, 1976).

The average minimum daily requirement for sodium is 400 mg (17 mEq). However, Americans average 6,000 to 10,000 mg/day or more of sodium. One
third of sodium ingested is added to food at the table. The other two-thirds is naturally-occurring sodium or is sodium added during food processing (Houston, 1985). There is no evidence that sodium restriction above 17 mEq is harmful (Houston, 1985; 1984 Joint National Committee, 1986; 1988 Joint National Committee, 1988).

The results of research into the effectiveness of dietary sodium restriction have been mixed. Studies of hypertensive subjects placed on sodium-restricted diets have shown that a low-salt diet can lower blood pressure (Kempner, 1948; MacGregor et al., 1982; Morgan et al., 1978; Morgan and Myers, 1981; Parijs et al., 1973). However, the authors of two studies concluded that a moderate sodium restriction has a questionable benefit or does not lower blood pressure (Richards et al., 1984; Watt et al., 1983). In his review of literature, Kaplan (1985) agreed with the efficacy and prescription of a sodium-restricted diet in reducing blood pressure. He cautioned to monitor blood pressure closely to detect any increases which would indicate the need for drug therapy. Morgan and Anderson (1987) found that dietary sodium restriction will delay a return of hypertension when well-controlled patients are removed from drug therapy. A sodium-restricted diet has been shown to be an effective adjunct to antihypertensive drug therapy (Kristinsson et al., 1988).

One possible explanation for the conflicting findings about sodium restriction may relate to the belief that people are either salt sensitive or salt resistant (Houston, 1985; 1984 Joint National Committee, 1986). People who are salt sensitive have a significant drop in blood pressure when dietary sodium is reduced and have a rise in blood pressure when
dietary sodium is increased. Salt-resistant people do not develop hypertension with large amounts of dietary sodium (Houston, 1985; 1984 Joint National Committee, 1986). Houston stated that severe sodium restriction (less than 20 mEq/day or approximately 0.5 gm/day) will normalize blood pressure in 30% to 50% of people with hypertension. Restriction of 20 to 70 mEq/day (approximately 0.5 gm to 1.5 gm/day) will significantly decrease blood pressure in salt-sensitive people, and a moderate restriction of sodium (70-150 mEq/day or approximately 1.5 to 3.0 gm/day) will cause a smaller decrease in blood pressure in those salt-sensitive people with mild to moderate hypertension.

Although the effectiveness of treating hypertension with a sodium-restricted diet is not universally accepted, the use of this treatment is reported in the literature as a primary treatment for borderline and mild hypertension (Goodman, 1986; Houston, 1985; 1984 Joint National Committee, 1986). Both the National Institute of Health and the American Heart Association (American Heart Association Committee, 1980; 1984 Joint National Committee 1986; 1988 Joint National Committee, 1988) recommended that physicians try hypertension treatment with nonpharmacological methods before using drug therapy. The benefit of drug therapy for mild hypertension, weighed against cost, side effects, and lifestyle impairment, has been questioned (McCarron, 1984; Toth and Horwitz, 1983).

Compliance with a low-salt diet may lower blood pressure, decrease the need to take increasing amounts of medication, and decrease the risks of complications associated with hypertension. However, any treatment for hypertension is worthless unless the patient follows it. Unfortunately,
reports on compliance with various treatments show that compliance is, in
general, low. Sackett and Snow (1979) reported ranges of compliance in
their review of compliance literature. The average rate for all types of
compliance was 50%. Client adherence to medication regimens was only 50%.
Fifty percent of subjects complied with follow-up appointments if they
were adults, and 75% of subjects complied if they were children. Sackett
and Snow reviewed three studies on dietary compliance. In two studies,
28% and 70% of patients adhered to their hemodialysis diet. Such a large
difference in results may be due to the compliance measures used. The
study with 28% compliance used interview, weight gain, and blood
chemistries to measure compliance, while the second study (with 70%
compliance) relied only on staff assessments of compliance. In the third
study, weight reduction diets were adhered to by 29% of the clients, if
the weight loss was greater than 20 pounds and 8% if the weight loss was
less than 20 pounds. Dunbar and Stunkard (1979) reported high dropout
rates (9% to 80%) for dietary treatment in their review of literature on
adherence to diet and drugs.

In an attempt to identify the causes of noncompliance with medical
treatment, researchers have studied factors believed to be associated with
compliance. Studies have demonstrated that there are many factors which
are not associated with compliance. Demographic variables, such as age,
sex, socioeconomic status, education, religion, marital status, and race
have not been found to be predictive of compliance (Dunbar and Stunkard,
1979; Marston, 1970; McDonald and Grimm, 1985). Psychological and
personality traits have not been successful in predicting compliance
(McDonald and Grimm, 1985). In a review of compliance literature, Haynes (1979) concluded that disease features (disease severity, severity of symptoms, previous experience with disease, and concurrent illness) are not important determinants of compliance in most patients. However, there is evidence that there is a decrease in compliance when disease symptoms increase (McCord, 1986).

Multiple factors have been found to affect a person's ability to follow advice from a health care professional. Some psychosocial factors that have been associated with compliance include health beliefs, locus of control, attitudes, and social support (Dunbar and Stunkard, 1979; Marston, 1970; McCord, 1986). Patient education, including specific instruction about the therapy, contributes to compliance (McDonald and Grimm, 1985). The impact of a therapeutic regimen (complexity, daily routine, duration, side effects, and cost) affects compliance behavior (McCord, 1986). Dunbar and Stunkard (1979) listed characteristics of the clinician which are associated with compliance. Satisfaction with care and caregivers positively influences compliance, and compliance increases if people see the same physician with each visit. Other physician factors that increase compliance are warmth and empathy, an active interest in the client, and genuine concern.

Factors which are associated with compliance are numerous. Obviously, not all factors can be studied simultaneously. Therefore, this study is limited in scope to the relationship between health beliefs and compliance. In recent studies, health beliefs have been shown to correlate with treatment compliance and professional advice (Dai and
Significance of the Research

Client nonadherence with medical treatment is a problem because effective and safe treatment does not help if the patient does not comply. When there is no intervention to mitigate the disease process or any subsequent sequella, the disease may be prolonged or may increase in severity. Noncompliance can neutralize the benefits of preventative or curative services, and can increase the cost of health care through additional and possibly unnecessary diagnostic and treatment procedures (Becker and Maiman, 1980). Even when clients partially adhere to treatment, the intervention may not be effective. For example, blood pressure medication may not be taken in full doses or frequently enough to effectively lower pressure. Nonadherence wastes time and effort by both the client and professional (Becker and Maiman, 1980).

Patient instruction and monitoring is a basic function of nursing. Because of the nurturing and educational focus of nursing, nurses are in a unique position to enhance patient compliance.

This study is important for several reasons. First, by knowing what health beliefs are related to compliance, nurses can intervene effectively to enhance the compliance of their clients. Second, because nursing attempts to improve quality of life, enhancing an individual’s compliance with antihypertension treatment may reduce complications resulting from hypertension. Third, enhancing compliance with a sodium-restricted diet
may eliminate the need for medication or may reduce the amount of medication taken. Less medication reduces cost and avoids drug side effects (McCarron, 1984). Fourth, this research is significant because it contributes to a scant knowledge base about compliance with sodium-restricted diets. Fifth, comparison of the relationships among compliance measures to examine their validity may contribute to future research about compliance.

**Purpose of the Research**

Compliance with hypertension treatment is a problem for clients and health professionals. Generally, the current practice is to prescribe a low-salt diet whether the primary intervention is diet alone or diet used in conjunction with medication. However, the ubiquitous use of salt in the United States is a hindrance to compliance with a sodium-restricted diet. The general purpose of this study was to investigate the relationship between health beliefs and compliance with a sodium-restricted dietary regimen and to study the relationship among compliance measures to examine their validity. There were seven research questions, as follows:

1. What the relationship is between the total score of the health belief concepts (resusceptibility, severity, and benefits) and compliance with a sodium-restricted diet;
2. What the relationship is between perceived resusceptibility of hypertension and compliance with a sodium-restricted diet;
(3) What the relationship is between perceived severity of hypertension and compliance with a sodium-restricted diet;

(4) What the relationship is between perceived benefits of antihypertension treatment and compliance with a sodium-restricted diet;

(5) What the relationship is among the compliance measures of blood pressure, urine chloride, questionnaire, and dietary recall;

(6) What health benefits (total score, resusceptibility, severity, or benefits) are significant predictors of compliance; and

(7) What do clients perceive as barriers to compliance with a sodium-restricted diet.

Summary

In this chapter, an overview of the problem of compliance with nonpharmacological hypertensive treatment was presented. Cardiovascular disease, the largest single cause of death in the United States, is costly both monetarily and in relation to quality of life. Because dietary ingestion of salt may significantly contribute to hypertension, it is a common practice for physicians to prescribe sodium restriction in an attempt to lower blood pressure. However, compliance with most medical treatment is low. Noncompliance may neutralize the treatment benefits and
may increase the cost of health care. Health beliefs may be predictive of a person’s compliance level.

The significance of the study was discussed. Nurses are in a unique position to enhance compliance and improve quality of life. Knowing more about health beliefs may facilitate enhancement of patient compliance with antihypertensive treatment. This study contributed to the general knowledge about compliance with sodium-restricted diets and compliance measurements.

There were seven research questions which this study attempted to answer. The questions were about the relationship between health beliefs and compliance, the predictability of compliance, barriers to compliance, and the relationship between compliance measures.
CHAPTER TWO

CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW

Chapter Two presents the conceptual framework and review of literature. The conceptual framework was based on the Health Beliefs Model (Rosenstock, 1966), and it is supported by studies presented in the review of literature.

Conceptual Framework

The conceptual framework for this study consisted of two constructs, health beliefs and compliance (Figure 1). The concept-referencing health beliefs were perceived susceptibility, perceived severity, and perceived benefits of treatment. Subconcepts specific to health beliefs about hypertension were perceived resusceptibility to hypertension, perceived severity of hypertension, perceived benefits of antihypertension treatment, and perceived barriers to antihypertension treatment. The concept-referencing compliance was compliance with treatment. The subconcept specific to hypertension was compliance with a sodium-restricted diet.

Health Beliefs

The construct health beliefs was based on the Health Belief Model (HBM). The HBM was developed in the 1950s by a group of research psychologists working for the Public Health Service who sought to explain why people did not participate in preventative health testing (health behaviors) for asymptomatic diseases such as tuberculosis, cervical
Figure 1. Conceptual framework for health beliefs and compliance with a sodium-restricted diet.
cancer, and dental diseases. It is the perception or belief of the health care recipient which the HBM attempts to explain, not the professional's perceptions of health (Rosenstock, 1966, 1974).

The basis of the HBM is Lewinian field theory. Field theory is a method of analyzing causal relations and of building scientific constructs (Lewin, 1951). The theory proposes that people live in life spaces composed of regions that are of positive, negative, or neutral value. Life space consists of the person and the psychological environment as it exists for him or her (Lewin, 1951). Some aspects of the world are perceived as attractive and desirable, and other aspects are not. Regions of the world that are negatively valued by an individual exert forces which are repelling for that person, while those regions of the world that are positively valued exert attracting forces for that person. Diseases are negatively valued and usually exert a repelling force on humans. The HBM tries to explain the relationship between a repelling force and human behavior (Rosenstock, 1974).

The original Health Beliefs Model has five major concepts: (1) the individual's perception of susceptibility to a particular disease, (2) perception of the severity of that disease, (3) perceived benefits of action taken, (4) perceived barriers to action taken, and (5) cues to action. These beliefs are the basis for an individual's decisions regarding health care. Two beliefs, perceived susceptibility and perceived severity, indicate a psychological state of readiness to take specific action for disease prevention. When people are concerned about a particular aspect of their health, they are open to action that will
prevent disease related to that aspect. This concern, of susceptibility to and severity of disease, is a necessary condition prior to taking a preventative health action. The third belief, perceived benefits of treatment, is the belief that the course of action is beneficial in reducing the disease threat after considering physical, psychological, financial, and other barriers to taking action (Becker and Maiman, 1975; Rosenstock, 1966, 1974). A cue to action sets the desired action in motion. Cues to action can be external, such as a reminder to update immunizations or internal, such as disturbing symptoms (Rosenstock, 1974). Because there are few reliable and valid instruments available to operationalize cues to action, it was not included in this study.

Perceived susceptibility is defined as a person's belief that he or she can contract a disease. People vary in their perceptions of personal susceptibility to disease even in similar situations. Some people may not perceive a threat of illness and are not concerned. Others may admit to a remote statistical possibility of contracting a disease, but not feel they are in real danger of being sick. Some people may think it is likely they will contract a disease and feel highly susceptible to it (Rosenstock, 1966, 1974).

Perceived severity is defined as the belief that a disease, once contracted, will adversely affect the individual's life (emotionally, socially, or physically). The perceived degree of severity varies from person to person (Jette et al., 1981; Rosenstock, 1966).

Perceived benefit of taking action is the individual's belief in how beneficial the chosen action is in preventing disease. Beliefs are
influenced by popular opinion and norms of the social group to which a person belongs (Rosenstock, 1966).

Perceived barriers to taking action are the negative aspects that occur with a chosen action. A health action may be costly, painful, embarrassing, inconvenient, and upsetting (Rosenstock, 1966). The benefits for taking a health action must be greater than the barriers to taking it before a person will act against a disease threat. There is conflict when the desire for action and the barriers to action are both high (Rosenstock, 1966, 1974). Janz and Becker (1984) described this as a cost benefit analysis done by the individual to determine whether or not to pursue a course of action. If the action's benefits are not believed to be good enough to overcome the barriers, then the individual may avoid the action. For example, an annual Papanicolaou test for cervical cancer can be embarrassing for some females. Therefore, because of the barrier of embarrassment, some women may avoid this test that could detect an early curable cancer.

Perceived susceptibility and perceived severity create forces which lead to a behavior change, but they do not define the particular course of action taken. It is the person's belief about the effectiveness of the treatment and not the scientific facts that determines whether or not the person agrees to the treatment (Janz and Becker, 1984; Rosenstock, 1966, 1974).

The HBM was modified to explain health benefits of people with illnesses. The same type of attitudinal and motivational formula used to explain health behavior was applied to sick people (Becker, 1974). With
illness, because a diagnosis had already been made, the concept-perceived susceptibility was expanded to include three dimensions: (1) belief in the accuracy of the diagnosis, (2) perceived resusceptibility or recurrence of the disease, and (3) perceived susceptibility to other diseases or illness in general (Becker, 1974; Becker and Maiman, 1975). Perceived severity of a diagnosed illness is the degree of emotional, social, and physical harm that the illness may cause. Perceived benefits to action is the belief in the perceived usefulness of the treatment already received and the amount of general confidence in the usefulness of medical practices. Perceived barriers to action are the problems (e.g., cost, changes in pattern of behavior, complexity, duration, and side effects) that the illness may create for the sick person, caregivers, or family (Becker et al., 1974; Becker and Maiman, 1980).

In the present study's conceptual framework, inclusion of concepts specific to hypertension, perceived resusceptibility to hypertension, perceived severity of hypertension, perceived benefits to antihypertension treatment, and perceived barriers to antihypertension treatment were based on the modification of the HBM. Perceived resusceptibility to hypertension is the perception of vulnerability to hypertension and its sequella. Perceived severity of hypertension is the degree of emotional, social, and physical harm resulting from hypertension. Perceived benefits of antihypertension treatment is the belief in the usefulness of antihypertension treatment (Becker and Maiman, 1980). Perceived barriers to antihypertension treatment is the difficulty encountered in following a sodium-restricted diet. Perceived resusceptibility to hypertension,
perceived severity of hypertension, and perceived benefits of antihypertension treatment were operationalized using the Health Beliefs Questionnaire (Andreoli, 1981). Perceived barriers to action taken was operationalized by asking subjects to complete a sentence about what prevents them from complying with a low-salt diet.

Compliance

Compliance is defined by Haynes (1979) as the extent to which the patient's behavior coincides with the clinical prescription. This is a nonjudgemental definition. It is versatile in that it can be about any type of compliance. Clients can be compliant with medication, diet, attending clinic appointments, exercising, and other lifestyle changes (Haynes, 1979).

Dunbar and Stunkard (1979) identified three definitional approaches to compliance used by researchers. The first approach is to measure the degree of patient compliance. For example, researchers count the number of pills actually taken and divide them by the number of pills prescribed, or they compare the number of meals consumed according to direction. Therefore, the degree of compliance is measured by the number of pills taken or by the number of meals consumed correctly. A second approach is to categorize clients according to their level of compliance based on metabolic evidence of the presence of drugs in the body, the presence of a marker in blood or urine, self-report of compliance, or a clinician's subjective rating of compliance. Finally, some researchers use an index based on multiple behaviors to measure compliance. Knowledge about
treatment, following treatment prescription, and making follow-up appointments are examples of indexes which measure compliance.

There is controversy among health care professionals about the use of the term "compliance". Some believe that using the term "noncompliant" unfairly labels clients as problematic and uncooperative (Stanitis and Ryan, 1982). Dunbar and Stunkard (1979) urged professionals to use the term "adherence" because compliance suggests that the patient is a defaulter. They believe that a negative value is associated with the word noncompliance. Baer (1986), in discussing the negative image that the term noncompliance has, suggested that the concept may be viewed as a coercive force or brainwashing approach to achieve a goal. Others do not see the words compliance and noncompliance as problematic and use them interchangeably with adherence and nonadherence (Haynes, 1979). In the present report, the terms compliance and adherence are used interchangeably. Use of the terms compliance and adherence is not meant to be a judgment of client behavior. The terms are used only to describe behavior.

Compliance is difficult to measure reliably and accurately and can be measured using direct and indirect methods. Direct measurement is considered to be more accurate and objective than indirect measurement (Feinstein, 1974; Gordis, 1979). Three methods of direct measurement are pill counts, blood levels of medication, and urinary analysis for medication, metabolite, or a marker (Gordis, 1979). Biochemical analysis, such as blood levels or urinalysis, does not measure adherence over time.
It only measures recently-taken medication or recent dietary habits (Dunbar and Stunkard, 1979; Feinstein, 1974).

Examples of indirect methods to measure compliance include outcomes, reports, and interviews. Outcome (e.g., blood pressure) is not always a reliable compliance measure because clients may get better with low compliance or worse with high compliance due to individual variation in treatment response (Dunbar and Stunkard, 1979). Efficacy of treatment must be established to accurately measure compliance with indirect methods (Gordis, 1979). Gordis reported that not all regimen outcomes can indicate whether or not clients are compliant. He gave an example of a patient on antihypertensive medication who also receives reassurance by his physician with a consequent decrease of stress that may benefit the patient by lowering his or her blood pressure.

Interviews are the most sensitive and accurate indirect measure of compliance (Craig, 1985; Haynes et al., 1980). Hilbert (1985) concluded that patients will give accurate self-reports of compliance if a rapport has been previously established with the interviewer or the interviewer communicates concern for the patient. The interviewer's concern allows the patient to relax, therefore building trust. In their review of literature, Dunbar and Stunkard (1979) reported that poor compliance is often under-reported in interviews. Interviews are a main method of measuring dietary compliance. This is a problem in estimating portion size. There is a large chance of error, both under- and over-estimation, with dietary recall (Dunbar and Stunkard, 1979). Dunbar and Stunkard recommended that dietary histories be used with other compliance measures.
In this study, compliance with a sodium-restricted diet was defined as restricting ingestion of salt and salty foods to obtain a sodium restriction of 70-100 mEq/day. This is approximately 1.5 to 2.5 grams of sodium or 4 to 6 grams of salt daily (1988 Joint National Committee, 1988). In the present study, compliance with a sodium-restricted diet was operationalized by measuring urine chloride, diastolic blood pressure, a compliance questionnaire, and a dietary recall.

Review of the Literature

This review of the literature is divided into two parts. The first part is a review of studies about the HBM variables and compliance with nonhypertension regimens. The second part reviews studies concerning the HBM and compliance with hypertension regimens. The review of literature is divided in this manner to facilitate organization and summarization of the studies.

Studies of the HBM and Nonhypertension Regimens

Becker et al. (1974) studied health beliefs and compliance with treatment in mothers of 128 children with otitis media. They measured the mothers' compliance using six variables. The variables were knowledge of the medication names, knowledge of the number of times the medications were to be given, administration of the medication to the child, knowledge of the follow-up appointment date, fidelity in keeping the follow-up appointment, and the appointment-keeping ratio. The appointment-keeping ratio was defined as the number of appointments that were kept divided by
the number of appointments that were made in a 12-month period. In addition, compliance was also measured using antibiotic assay of the childrens' urine. Mothers who felt their children were resusceptible to another ear infection complied more with administering the medication and keeping the follow-up appointment. The mothers' perceived severity of the otitis media positively correlated with all the compliance measures except the appointment-keeping ratio. Interference with the child's or mother's activities (barriers to action) correlated with knowing the name of the medication, giving the medication, and the appointment-keeping ratio.

The health belief concepts of perceived resusceptibility and perceived severity were positively related to compliance with medication treatment by mothers of asthmatic children (Becker et al., 1978). Compliance was determined using interviews and measuring blood levels of theophylline. The researchers found that compliant mothers did not necessarily believe in the physician's ability to treat their children or in the medication's efficacy. Therefore, benefits of action did not correlate with treatment compliance. Perceived barriers to administering medication negatively correlated with medication compliance. This was in the expected direction (Becker et al., 1978).

Two studies demonstrate that contracting a disease again (resusceptibility) is associated with treatment compliance (Elling et al., 1960; Heinzelmann, 1962). Heinzelmann (1962) conducted an exploratory study of 284 college students with a history of rheumatic fever. He explored factors which differentiated between compliance and noncompliance with antibiotic prophylaxis of rheumatic fever. Compliance with treatment was
determined through interviews. He investigated psychological factors (health beliefs included), medical factors, sociological factors, and contact between patient and physician. He found that those subjects who perceived themselves as resusceptible to rheumatic fever and who believed the disease to be severe complied with prophylactic treatment. Elling et al. (1960) studied mothers of children with a history of rheumatic fever in their correlational study of health beliefs and compliance. Clinic records and self-reports were used to measure compliance. Mothers who believed that their children were resusceptible to the illness were higher compliers (gave their children medication and kept appointments) than mothers who did not believe their children were resusceptible to rheumatic fever.

In another study about rheumatic fever prophylaxis, Gordis et al. (1969) investigated demographic, medical, and social factors of compliance. Their subjects, mothers of children with a history of rheumatic fever, were categorized as compliant or noncompliant according to the presence of penicillin in their childrens' urine specimens. More noncompliant mothers believed that their children were resusceptible to rheumatic fever than compliant mothers. However, more compliant mothers believed another attack of rheumatic fever would be serious compared to mothers who were noncompliant.

Schatz (1988) compared two groups (compliers and noncompliers) of diabetic subjects to investigate variables (knowledge, HBM, and sociodemographic) affecting their compliance with a diabetic regimen. There is a significant difference in health beliefs between diabetic regimen
compliers and noncompliers. Determination of compliance was obtained through a computerized assessment of the subjects' answers to questions about blood testing, urine testing, diet, the taking of medication, control of hypoglycemia, control of hyperglycemia, and foot care. Additional questions about appointment keeping were also used to determine compliance. Schatz did not report a breakdown of the modified HBM variables but indicated that her conclusions were based on a composite score. She concluded that her study, although inconclusive, tended to support earlier studies which found the HBM useful in predicting compliance behavior.

Dai and Catanzaro (1987) did a correlational study of health beliefs and compliance with a skin care regimen in 20 paraplegic subjects. Compliance was determined through an open-ended interview. They found that perceived benefits and perceived severity of a skin care regimen correlated with compliance. Perceived efficacy of the skin care treatment (treatment would prevent pressure sores) correlated with compliance more than perceived severity of pressure sores. Perceived susceptibility of skin breakdown did not correlate with treatment compliance. The researchers thought this may be because most subjects stayed home and had the freedom to shift positions and transfer between the wheelchair and bed whenever they wanted. Perceived barriers to skin care did not correlate with compliance. The participants did not think that skin care was difficult. A composite score of health beliefs correlated strongly with skin care compliance compared to the individual health belief scores. The researchers concluded that the composite of the four variables had a
synergistic influence on compliance behavior and was more predictive of compliance than any single health belief variable.

Kelly et al. (1987) studied the relationship between the HBM and medication compliance in 107 psychiatric outpatients. The HBM variables studied were perceived susceptibility, perceived severity, perceived benefits of action, perceived barriers to treatment, and cues to action. Compliance was measured using subjects' self-reports about medication taking. Using bivariate analysis, they found that perceived susceptibility, perceived barriers (medication side effects), and cues to action significantly correlated with medication compliance. Using multiple regression, the authors found that 20% of self-reported compliance behavior could be explained by a composite score of the five HBM variables. The authors believe that these data affirm the integrity of the HBM as a whole in explaining sick-role behavior in medication compliance. They suggested that investigating the HBM variables individually is not as helpful in explaining compliance as a composite score of the variables.

Rees (1986) conducted research which tested the hypothesis that health beliefs are determinants of compliance behavior in alcoholic patients. Subjects in the experimental groups attended meetings that attempted to modify health beliefs. Rees found that changes in health beliefs among the experimental group were modest when compared to the control group (where there was no attempt to change health beliefs). Rees provided three possible explanations for this. First, other factors may explain and predict compliance better than health beliefs. Second, there
may be a basic characteristic or personality attribute which accounts for the correlation between health beliefs and compliance and that changing beliefs may not alter this characteristic. Third, it may be necessary to reach a critical level before a causal relationship between health beliefs and compliance begins.

Pederson et al. (1984) studied the relationship between health beliefs and compliance with physician's anti-smoking advice in 308 newly-diagnosed pulmonary patients. Compliance with anti-smoking advice was measured by self-reports. They studied four beliefs, two of which (perceived severity and efficacy of treatment) are included in the HBM. Their hypothesis, that health beliefs are related to cessation of smoking, was supported using multivariate statistical procedures.

The relationship of health beliefs and knowledge to exercise compliance was investigated by Tirrell and Hart (1980). They were unable to find correlations with exercise compliance for perceived severity, perceived benefits of action, and a composite score of the health belief variables in their study of patients who had undergone coronary bypass surgery. Health beliefs that were associated with exercise compliance were perceived barriers to action and perceived resusceptibility. Compliance measurements were obtained through interviews.

Few studies have investigated the relationship between health beliefs and dietary compliance. Two studies have investigated the relationship between health beliefs and adherence to dietary restrictions for dialysis patients (Cummings et al., 1982; Hume, 1984).
Hume (1984) studied 25 peritoneal dialysis patients. The study's purpose was to identify factors perceived by patients as influencing adherence to their prescribed diets. The factors included health values, health beliefs, and situational factors. The study findings were based on descriptive studies only. Nineteen subjects reported that the seriousness of their illness improved their dietary compliance. Change from the previous dietary pattern was reported by 19 subjects as the factor which most frequently interfered with dietary compliance. Difficulty in understanding the diet instructions led to nonadherence in less than one-third of the subjects. A few subjects reported food cost and factors related to food purchase and preparation as contributing to nonadherence.

Cummings et al. (1982) studied health beliefs, knowledge of treatment, social support, treatment history, personal characteristics, and self-reported compliance with medication, diet, and fluid intake in 116 hemodialysis patients. Dietary adherence was measured with self-report, serum phosphorus, serum potassium, and weight gain between dialysis treatments. The investigators found a significant relationship between perceived benefits of diet and limited fluid intake. Perceived barriers to treatment was related to compliance by the measures of self-report, serum potassium, and weight gain between dialysis treatments. Perceived susceptibility to sequella associated with noncompliance correlated with self-reported compliance with diet and fluid restriction.

The studies above demonstrate relationships between the HBM variables and compliance with treatment. The relationships between
perceived susceptibility to illness, perceived severity of illness, perceived barriers to action, and compliance with treatment received strong support. The relationship between perceived benefits of treatment and compliance was modestly supported. Three studies (Dai and Catanzaro, 1987; Hume, 1984; Kelly et al., 1987) found that a composite score of the HBM variable was associated with treatment compliance. Tirrell and Hart (1980) did not find this association between a composite score of the HBM variables and compliance with treatment.

Studies of the HBM and Antihypertension Regimens

Hershey et al. (1980) studied the relationship between the HBM concepts of perceived susceptibility, perceived severity, perceived benefits of action, and barriers to action taken with self-reported antihypertension medication compliance. Perceived susceptibility, perceived severity, and perceived benefits of action did not have significant statistical support in their study of 132 subjects. They concluded that these health beliefs may not predict compliance among high blood pressure patients. However, they did find a significant relationship between barriers to action and compliance with treatment. When subjects perceived more barriers, they were less compliant in taking medication.

In a prospective study of 128 newly-diagnosed hypertensive subjects, Taylor (1979) studied health belief concepts and medication compliance prior to treatment, six months after initiating treatment, and 12 months after initiating treatment. Compliance measurements were obtained through
pill counts, record reviews, and interviews. The researcher investigated whether subjects' health beliefs preceded treatment or changed with or after treatment. The study findings were that health beliefs measured before initiation of drug treatment did not predict compliance six or 12 months after initiation of treatment. Taylor concluded that health beliefs developed along with compliance behavior as a result of experience with treatment. He suggested that attempts to modify health beliefs may not be successful in improving compliance.

Nelson et al. (1978) studied the perceptions of health, disease, and medical treatment and their relationship to compliance in 142 hypertensive subjects. Compliance was measured by blood pressure control, self-reported medication taking, and appointment keeping. They found a correlation between perceived severity of hypertension and self-reported medication compliance. Subjects who believed in the efficacy of their treatment had better blood pressure control. The researchers summarized that, in their study, only two HBM variables made independent contributions to compliance: perceived severity of hypertension and perceived efficacy of the treatment.

Kirscht and Rosenstock (1977) studied 132 hypertensive subjects to identify factors related to adherence of antihypertension medical regimens. Compliance was measured by self-report of medication use, self-report of ability to follow dietary recommendations, and reviews of medical and pharmacy records. The authors found that the HBM concept of perceived susceptibility to the effects of hypertension was significantly related to medication compliance.
Andreoli (1981) could find no difference in the health beliefs (perceived resusceptibility, perceived severity, and perceived benefits) of 71 hypertensive males identified as either compliant or noncompliant. Compliance was measured with blood pressure readings and staff assessment of compliance. She concluded that health beliefs may not be useful in distinguishing between compliant and noncompliant male hypertensive subjects.

In a study similar to Andreoli's (1981), Cronin (1986) studied 38 hypertensive subjects to compare health beliefs of compliers and noncompliers of antihypertension regimens. Health beliefs investigated were perceived resusceptibility to hypertension, perceived severity of hypertension, and perceived benefits of antihypertension treatment. Compliance was measured by using therapeutic outcome (diastolic blood pressure) and self-report. Cronin was unable to find significant differences in the health beliefs of compliers and noncompliers, suggesting that health beliefs may not be useful in distinguishing between the two groups.

In their research of 30 hypertensive subjects, DeVon and Powers (1984) studied the influence of health beliefs on compliance and psychosocial adjustment. Compliance was measured with a questionnaire based on the HBM. No significant difference in health beliefs between subjects with controlled hypertension and subjects with uncontrolled hypertension was identified. DeVon and Powers questioned the ability to predict compliance of hypertensive patients based on the HBM.
These studies of the HBM variables and compliance with hypertension treatment regimens give ambivalent support to association between health beliefs and compliance. Nelson et al. (1978) found a positive relationship between perceived severity of hypertension and compliance with medication taking and appointment keeping. Krischt and Rosenstock (1977) were able to show a relationship between perceived susceptibility to the effects of hypertension, severity of hypertension, and benefits of antihypertension treatment with medication and dietary compliance. One study supported a relationship between perceived barriers to antihypertension treatment and compliance (Hersey et al., 1980). However, in two other studies, Andreoli (1981) and Cronin (1986) were unable to find differences in health beliefs between compliant and noncompliant hypertensive subjects. Similarly, DeVon and Powers (1984) could find no differences in health beliefs between controlled and uncontrolled hypertensive subjects. In a prospective study, Taylor concluded that health beliefs develop along with compliance as a result of experience with treatment and are not predictive of compliance behavior.

Summary

The conceptual framework and review of literature were presented in this chapter. The conceptual framework was based on a modification of the Health Beliefs Model (Becker, 1974). The independent variables were developed from four concepts of the modified HBM (perceived susceptibility, perceived severity, perceived benefits, and perceived barriers). The dependent variable was compliance with a sodium-restricted diet.
The review of literature gave ambivalent support to a relationship between the HBM variables and compliance with hypertension treatment. Studies of nonhypertension treatment regimens support the relationships between health beliefs and compliance more than studies of hypertension treatment regimens. A major difference between the two groups of studies is that there is less use of direct compliance measures in the studies of hypertension regimens. Most of the hypertension regimen research used self-report or other indirect means to measure compliance behavior. As discussed earlier, indirect compliance measures are less accurate than direct compliance measures (Feinstein, 1974; Gordis, 1979). The present study of compliance with sodium-restricted diets measured compliance with the direct measurement of urine chloride. Indirect measures were also employed so that a comparison of different types of compliance measurements could be made.
CHAPTER THREE

METHODOLOGY OF THE STUDY

Chapter Three presents a description of the study design, setting, sample, protection of human subjects, instruments, data collection protocol, and data analysis plan. This study employed a correlational design to describe the relationship between health beliefs and compliance with a sodium-restricted diet. The relationships among the compliance measures (blood pressure, urine chloride, compliance questionnaire, and dietary recall) were also investigated.

The Setting

Data were collected in two settings. The first setting was a group of nurse practitioner managed wellness clinics sponsored by a nonprofit general hospital in Tucson, Arizona. The clinics, usually conducted once a week, were located in or near mobile home parks, apartments, retirement centers, and churches. The second setting of the study was the subjects' homes.

The Sample

The study population was hypertensive elderly people. A convenience sample of 30 subjects was selected using the following criteria:

(1) They were able to read and write English;
(2) They were continent of bowel and bladder;
(3) They were physically able to collect overnight urines;
(4) They had been diagnosed with hypertension for at least six months;

(5) They were stabilized on medication during the study;

(6) They had a prescribed low-sodium diet (no added salt or salty foods) and had received instruction on the diet prior to the study; and

(7) They were not taking potassium chloride preparations.

Clinic charts were reviewed for subject eligibility prior to invitation into the study. It was necessary that the subjects be physically able to collect uncontaminated overnight urine specimens. The subjects had to be stabilized on hypertension medications so that fluctuation in blood pressure would not be attributed to medication changes. Subjects needed prior instruction on a low-sodium diet. They could not be expected to be compliant or noncompliant if no prior instruction had been given. To control for variation in diet instruction, the dietary prescription had to include instruction to not add salt to food and to not eat salty foods. Because urine chloride was used to measure sodium excretion, medications and salt substitutes containing chloride would interfere with the urine tests.

Protection of Human Subjects

The study was submitted for review to The University of Arizona Human Subjects Committee and to the Human Subjects Committee of St. Mary's Hospital and Health Center, Tucson, Arizona (Appendix A). All subjects
were given verbal and written explanations about the study prior to participation. Written consent was obtained from each subject prior to his or her participation in the study (Appendix B). Anonymity and confidentiality of subjects were maintained. Study findings and individual information (blood pressure, urine chloride, and nutritional analysis) derived from the data were shared with interested subjects.

**Instruments**

Demographic Data Form (Appendix C)

Basic demographic information was collected from each subject using a nine-item tool. These data included age, sex, yearly income, race, marital status, occupation, and educational level achieved. Additional information included the length of time which the subject had been hypertensive and the type of sodium limitations prescribed.

Knowledge of a Sodium-Restricted Diet (Appendix C)

Subjects were asked to list foods that are low in salt and foods that are high in salt. The correct number of foods in one category (low salt or high salt) was divided by the total number of foods in the category to obtain a percentage of correct responses. The percentages from the two categories were averaged for a total score. If the total score was 70% or greater, the subject was considered to be knowledgeable about a low-salt diet.
Health Beliefs Questionnaire (HBQ) (Appendix C)

The Health Beliefs Questionnaire (Andreoli, 1981) measured health beliefs about hypertension. The subjects' beliefs about perceived resusceptibility to hypertension and its sequella, perceived severity of hypertension, and perceived benefits of a therapeutic regimen for hypertension were measured using the HBQ. The instrument was in a Likert style format. There were 15 items from which subjects chose one of five responses ranging from completely false to completely true (Andreoli, 1981). The responses were scored from one (completely false) to five (completely true). A total score of the HBQ was obtained by adding the item scores of the whole instrument. The HBQ had three subscales (perceived resusceptibility to hypertension, perceived severity of hypertension, and perceived benefits of antihypertension treatment) of five items each. Subscale scores were obtained by adding the item scores of the individual subscales.

Reliability of the HBQ was measured by a test-retest method with seven hypertensive adults (Andreoli, 1981). Andreoli (1981) reported that the correlation coefficient for the total Health Beliefs Questionnaire was 0.70. The correlation coefficient for perceived resusceptibility to hypertension was 0.59; for perceived severity of hypertension, it was 0.71; and for perceived benefits of antihypertension treatment, it was 0.66. The questionnaire was designed with an 8th-grade reading level (Andreoli, 1981). Permission to use the HBQ was obtained from Dr. Andreoli (Appendix D).
Urine Chloride

Quantab® Chloride Titrators (titrator strips) are thin, chemically-inert plastic strips which measure chloride in aqueous solutions (Environmental Test Systems, Inc., 1986). Although 24-hour urine is more accurate in measuring ingested sodium, overnight specimens provide considerable accuracy in testing compliance (Luft et al., 1983). Luft et al. (1983) found that measurement of urine chloride by the titrator strips correlates highly with nocturnal sodium excretion and is 79\% accurate in measuring compliance of a low-salt diet with three overnight urine collections.

The titrator strips are placed in an aqueous solution, and the fluid rises through capillary action up a column impregnated with silver dichromate. A reaction of silver dichromate with chloride (salt) produces a color change in the capillary column from orange to white. When the capillary column is saturated, a moisture-sensitive signal across the top of the column turns dark blue, indicating completion of the reaction. The titrator strips can be read up to five minutes after the color change occurs. The titrator strips have graduated markings from 1 to 10, and the markings are read at the tip of the white color change. The manufacturer provides a calibration table that correlates percent of sodium chloride with the graduated markings on the titrator strips (Environmental Test Systems, Inc., 1986).

In the present study, the average percent of sodium chloride from three overnight urine specimens was calculated for use in data analysis. The titrator strips were placed in 80 milliliters of urine or urine/dis-
tilled water solution. The titrator strips were observed until the signal color change occurred. After three minutes, the titrator strips were removed from the solution. Excess fluid was squeezed out the open end of the strip to make the test results permanent. The titrator strips were read as described above. The manufacturer recommends dilution for concentrations greater than 8. If the urine chloride was too concentrated for the titrator strip to measure (the tip of the color change was above 8), the urine was diluted to a 50% solution with distilled water. The result of the diluted urine solution was multiplied by 2 to obtain the true salt content of the sample (Environmental Test Systems, Inc., 1986). The percent of sodium chloride was converted to milli-equivalents of chloride for reporting purposes.

Rater reliability in reading the titrator strips was established by two methods: repeated readings of one overnight urine specimen using four titrator strips, and by confirmation of all titrator strip results by a second person. To establish rater reliability in repeated readings of one overnight specimen, 80 milliliters of the urine/distilled water solution were measured into two specimen cups (labeled specimen #1 and specimen #2). Two titrator strips were placed into the urine/distilled water solution. Both titrator strips measured the chloride concentration of the urine/distilled water solution at 107.7 mEq/l (0.627% NaCl). The procedure was repeated using the same urine/distilled water solution. The repeated chloride concentration reading of the two urine/distilled water solutions was again 107.3 mEq/l (0.627% NaCl).
Blood Pressure

Blood pressure was measured using either a mercury or aneroid sphygmomanometer (calibrated weekly) with diastolic pressure read at the last Korotkoff sound. The subject was in a sitting position for five minutes before the blood pressure reading was taken in the right arm. A cuff of appropriate size, according to the subject's arm circumference, was used. Three blood pressure readings were taken on three different days. The diastolic blood pressure readings were averaged. The same researcher took all the blood pressure readings.

Compliance Questionnaire (Appendix C)

A compliance questionnaire was developed by the researcher to measure the subjects' self-report of compliance. It consisted of two analog scales. Subjects were asked to rate (by marking the scale with an "X") their compliance with not adding salt to their food and not eating salty foods. The scales were numbered 1 (good compliance) to 10 (poor compliance). There were no validity or reliability tests of this instrument. However, content validity was supported by recommendations that a moderate reduction in salt intake can be achieved by not adding salt to food and by avoiding the consumption of salty foods (American Heart Association Committee, 1980; Houston, 1985; Kaplan, 1985; 1988 Joint National Committee, 1988), and that self-reporting of compliance can be an accurate measure (Hilbert, 1985).
Dietary Recall (Appendix C)

A tool to record dietary intake was developed for this study. Subjects recorded the type and amount of food they ate for all meals and snacks for one day. An interview format was used to review the completed dietary recall with the subject. These data were entered into a nutritional analysis computer program, Nutritionist II (N-Squared, 1984) to calculate the total milligrams of sodium in one day's dietary intake.

Barriers to Taking Action (Appendix C)

Subjects were asked to complete a statement (It is difficult to follow my low-salt diet because ______________________.) about perceived barriers to compliance with a sodium-restricted diet. The responses were categorized to study the different reasons subjects could not maintain a low-salt intake. No attempt was made to quantify these responses; they were only analyzed in a qualitative manner.

Data Collection Protocol

Subjects who met the study criteria were invited to participate in the study during a routine wellness clinic visit. Subjects were given a verbal explanation about the purpose and methods of the research, and written subject consent was obtained. Subjects completed the demographic data form, the knowledge of a sodium-restricted diet form, the compliance questionnaire, and the HBQ during the clinic visit and in the presence of the researcher. For three days, the subjects collected overnight urine (from 10:00 p.m. to the first morning void) and, for one day, kept a
dietary recall of everything they ate. Each subject was visited three
times at home to collect the urine specimen and to take a blood pressure
reading. The dietary recall was collected during one of the home visits.
Through an informal interview, the dietary recall was reviewed for
completeness and accuracy.

Data Analysis Plan

Demographic data were analyzed using frequencies, percentages, mean,
standard deviation, and ranges. To answer research question one (Chapter
One), the total score of the HBQ and its relationship with sodium-restric
ted dietary compliance measures was analyzed using Pearson's correlation
coefficient. To answer research questions two through four, Pearson's
correlation coefficient was used to determine the existence, direction,
and magnitude of relationships between perceived resusceptibility to
hypertension, perceived severity of hypertension, and perceived benefits
of antihypertension treatment to sodium-restricted dietary compliance
measures. The relationships among the compliance measures were also
analyzed with Pearson's correlation coefficient to answer the fifth
research question. Significance for all the correlations was measured at
p < 0.05. Multiple regression was used to test the degree to which the
independent variables predict compliance to answer research question six.
Subject perception of barriers to a sodium-restricted diet was analyzed
by clustering responses and comparing them with each other to answer
research question seven.
Summary

This chapter described the methodology used in this research. A correlational design was employed to study the relationship of health beliefs to compliance of hypertensive elderly on sodium-restricted diets. Data were collected in wellness clinics and the subjects' homes. Criteria for inclusion in the study and protection of the subjects were discussed.

The instruments for data collection were described. Demographic data were collected using a nine-item form. Knowledge about a low-salt diet was determined by asking subjects to list foods that are low and high in salt. The HBQ and sentence completion (barriers to compliance with a sodium-restricted diet) operationalized the independent variables perceived resusceptibility to hypertension, perceived severity of hypertension, perceived benefits of antihypertension treatment, and perceived barriers to a sodium-restricted diet. The dependent variable, compliance with a sodium-restricted diet, was operationalized by testing urine chloride, taking blood pressures, collecting a dietary recall, and administering a compliance questionnaire.

The protocol for data collection included the subjects' completion of questionnaires in the clinic and home visits for collection of the urine specimens, blood pressure readings, and dietary recall.

The data analysis plan was described, and demographic data were analyzed using descriptive statistics. Pearson's correlation coefficient was used to determine the relationships among the health belief variables (with the exception of barriers to a sodium-restricted diet) and compliance variables. Multiple regression was used to test what health beliefs
significantly predict compliance. Finally, a qualitative method was used to analyze barriers to a sodium-restricted diet.
Chapter Four includes the presentation, analysis, and discussion of this study's findings. The description of the sample population and reliability of the HBQ is presented. Correlational, regression, and qualitative findings are related to the research questions. A discussion of additional findings and data is presented.

Demographic Characteristics of the Sample

Thirty adults ranging in age from 55 to 85 years old were subjects for this study (Table 1). The average age was 68 years old (SD = 8.79). A majority of the subjects (70%) were less than 75 years old. The length of time that the subjects had hypertension ranged from one to 30 years; the average number of years was 13.3 (SD = 8.6). Twenty subjects (66.7%) were female, and ten (33.3%) were male (Table 2). Twenty-four (80%) were married (Table 3), and five (16.7%) were widows or widowers. There were no single or divorced subjects. All were Caucasian. Five subjects (16.7%) had less than a high school education, while over 50% had completed high school (Table 4). More than 20% had attended college or obtained a college degree.

All but one of the subjects were retired. Incomes ranged from less than $5,000 to more than $40,000 (Table 5), and ten subjects had incomes less than $20,000. Eleven subjects (36.7%) reported incomes between
Table 1. Age of hypertensive adults by frequency and percent (N = 30).

<table>
<thead>
<tr>
<th>Age</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>55-64</td>
<td>10</td>
<td>33.2</td>
</tr>
<tr>
<td>65-74</td>
<td>11</td>
<td>36.7</td>
</tr>
<tr>
<td>75-84</td>
<td>7</td>
<td>23.3</td>
</tr>
<tr>
<td>85</td>
<td>1</td>
<td>3.3</td>
</tr>
<tr>
<td>Missing</td>
<td>1</td>
<td>3.3</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Mean 68.31
SD 8.79

Table 2. Gender of hypertensive adults by frequency and percent (N = 30).

<table>
<thead>
<tr>
<th>Gender</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>20</td>
<td>66.7</td>
</tr>
<tr>
<td>Male</td>
<td>10</td>
<td>33.3</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Table 3. Marital status of hypertensive adults by frequency and percent (N = 30).

<table>
<thead>
<tr>
<th>Marital Status</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Married</td>
<td>24</td>
<td>80.0</td>
</tr>
<tr>
<td>Widowed</td>
<td>5</td>
<td>16.7</td>
</tr>
<tr>
<td>Missing</td>
<td>1</td>
<td>3.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>30</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Table 4. Education of hypertensive adults by frequency and percent (N = 30).

<table>
<thead>
<tr>
<th>Education Level</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade school (1-8)</td>
<td>2</td>
<td>6.7</td>
</tr>
<tr>
<td>Some high school (9-11)</td>
<td>3</td>
<td>10.0</td>
</tr>
<tr>
<td>High school graduate (12)</td>
<td>17</td>
<td>56.7</td>
</tr>
<tr>
<td>Some college (13-15)</td>
<td>4</td>
<td>13.3</td>
</tr>
<tr>
<td>College graduate (16)</td>
<td>3</td>
<td>10.0</td>
</tr>
<tr>
<td>Missing</td>
<td>1</td>
<td>3.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>30</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>
Table 5. Income of hypertensive adults by frequency and percent (N = 30).

<table>
<thead>
<tr>
<th>Income</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;$5,000</td>
<td>1</td>
<td>3.3</td>
</tr>
<tr>
<td>$5,000-$10,000</td>
<td>6</td>
<td>20.0</td>
</tr>
<tr>
<td>$10,000-$20,000</td>
<td>3</td>
<td>10.0</td>
</tr>
<tr>
<td>$20,000-$30,000</td>
<td>11</td>
<td>36.7</td>
</tr>
<tr>
<td>$30,000-$40,000</td>
<td>2</td>
<td>6.7</td>
</tr>
<tr>
<td>&gt;$40,000</td>
<td>4</td>
<td>13.3</td>
</tr>
<tr>
<td>Missing</td>
<td>3</td>
<td>10.0</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 6. Average three-day diastolic blood pressure by frequency and percent (N = 30).

<table>
<thead>
<tr>
<th>BP</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>64</td>
<td>2</td>
<td>6.7</td>
</tr>
<tr>
<td>65-69</td>
<td>4</td>
<td>13.3</td>
</tr>
<tr>
<td>70-74</td>
<td>5</td>
<td>16.7</td>
</tr>
<tr>
<td>75-79</td>
<td>6</td>
<td>20.0</td>
</tr>
<tr>
<td>80-84</td>
<td>4</td>
<td>13.3</td>
</tr>
<tr>
<td>85-89</td>
<td>6</td>
<td>20.0</td>
</tr>
<tr>
<td>90-94</td>
<td>2</td>
<td>6.7</td>
</tr>
<tr>
<td>95</td>
<td>1</td>
<td>3.3</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Mean 78.2
SD 9.18
$20,000 and $30,000, and four subjects (13.3%) had incomes greater than $40,000.

All of the subjects were being treated with a sodium-restricted diet for high blood pressure. Many (N = 28) were treated concurrently with drugs. All of the subjects had been instructed by their physicians, prior to the study, to limit salt by not adding salt to food and to not eat salty foods. Eighty-seven percent of the sample demonstrated knowledge of a low-salt diet by correctly listing foods which were high and low in salt.

Health Beliefs Questionnaire

The Health Beliefs Questionnaire total score and three subscale scores were analyzed using frequencies and reliability testing. Twenty-nine subjects answered 100% of the HBQ, and one subject failed to answer one question on the HBQ. The missing item was number 10 (having hypertension means that one is in danger of getting a stroke).

The range of scores for the total HBQ was from 49 to 73 (possible range was from 15 to 75). The mean score was 65.4 (SD = 6.08). The scores for the first subscale, perceived resusceptibility to hypertension, ranged from 11 to 25 (possible range was from 5 to 25). The mean score was 21.6 (SD = 2.96). The scores of the second subscale, perceived severity of hypertension, ranged from 14 to 25 (possible range was from 5 to 25). The mean score was 21.7 (SD = 2.72). The final subscale, perceived benefits of antihypertension treatment, had scores ranging from
16 to 25 (possible range was from 5 to 25). The mean was 22.1 (SD = 2.37).

The distributions of scores of the HBQ were negatively skewed (total HBQ score, -1.31; perceived ressusceptibility to hypertension, -1.66; perceived severity of hypertension, -0.70; perceived benefits of antihypertension treatment, -0.90). The range of scores was abbreviated because most subjects scored high on the questionnaire items. The subjects may have had similar responses on the HBQ because they were recruited from a wellness program. Their participation in a wellness program indicates concern about their health and health care maintenance. As in this study, Cronin (1986) found that the HBQ did not discriminate well between individuals and that the scores were high.

Reliability of the HBQ was determined by testing internal consistency using Chonbach's alpha reliability coefficient (alpha coefficient). The alpha coefficient of the total HBQ was 0.58. The reliability analysis of the first subscale, perceived ressusceptibility to hypertension, yielded an alpha coefficient of 0.34. The second subscale, perceived severity to hypertension, had an alpha coefficient of 0.44. The alpha coefficient of the third subscale, perceived benefits of antihypertension treatment, was 0.46. These reliability coefficients did not meet the acceptable alpha coefficient criterion of α0.70.

The HBQ total scale and subscales were revised based on the initial reliability analysis. Individual questionnaire items were evaluated to determine if there were any items that contributed to the low reliability. Items 4, 9, and 12 were dropped in an attempt to increase the reliability
of the HBQ. The alpha coefficients increased to 0.66 for the total HBQ, 0.60 for perceived resusceptibility to hypertension, 0.43 for perceived severity of hypertension, and 0.52 for perceived benefits of antihypertension treatment.

Reliability was lower for this study than previous studies using the same instrument. Andreoli (1981), using a test-retest method of reliability testing, reported a correlation of 0.70 for the total HBQ, 0.59 for perceived resusceptibility to hypertension, 0.71 for perceived severity of hypertension, and 0.66 for perceived benefits of antihypertension treatment. Using an internal consistency test, Cronin (1986) reported Cronbach's alpha coefficients of 0.58 for perceived resusceptibility to hypertension, 0.56 for perceived severity of hypertension, and 0.53 for perceived benefits of antihypertension treatment.

In this study, an internal consistency test was used to determine reliability for the HBQ. Different test methods may account for the difference between the HBQ reliability in this study and Andreoli's (1981) study. However, it is unlikely since Cronin (1986), also using an internal consistency method to determine reliability, had scores similar to Andreoli's. The small variance of scores in this study may be why the instrument had poor reliability.

Measures of Compliance

Five measurements of compliance were used in this study. The indirect methods of compliance measurement were dietary recall, a compliance questionnaire (two analog scales), and blood pressure. The
fifth compliance measure, a direct method, was an overnight urine chloride test.

Dietary Recall

The amount of milligrams of sodium that the subjects consumed for one day was obtained by dietary recall. The subjects' consumption of sodium for one day ranged from 928 mg to 3576 mg; the average sodium intake was 2156 mg. Seventy-seven percent of the subjects consumed less than 2.5 gm/day (100 mEq/day), indicating compliance with a moderate salt-restricted diet for one day. Fifty-three percent of the sample had sodium intakes greater than the average. However, the average was below a moderate sodium-restriction level. Although the subjects were cautioned to not change their eating habits, participation in the study may have influenced their usual eating habits, resulting in a lower sodium intake for that day. Another explanation is that the subjects may have been very compliant with their physicians' dietary prescription.

Blood Pressure

The average of three diastolic blood pressure (DBP) readings ranged from 64 mmHg to 95 mmHg (Table 6). The average of the average DBP was 78 (SD = 9.2). Twenty-seven (90%) subjects had an average DBP of less than 90 mmHg.

The range of individual diastolic blood pressures was from 60 to 104 mmHg. Six (20%) subjects had individual DBPs greater than 90 mmHg. Diastolic blood pressures equal to or less than 90 mmHg are within
acceptable upper blood pressure limits (1988 Joint National Committee, 1988). One subject had large fluctuations in the three diastolic blood pressures (70 mmHg, 92 mmHg, and 66 mmHg). There was no explanation for this.

Compliance Questionnaire

The compliance questionnaire had two analog scales. The first was the subject's self-rating of how well he or she complied with not adding salt to food (added salt), and the second scale was the subject's self-rating of his or her compliance with not eating salty foods (salty foods). There was a possible range of 1.0 (good compliance) to 10.0 (poor compliance) for both scales.

The range of scores for self-rated compliance with not adding salt to food was 1.0 to 6.0 (Table 7). Ten subjects (33%) rated their compliance with a score of 1.0, indicating good compliance. The highest rating was 6.0, indicating fair compliance. The mean score was 2.7 (SD = 1.6).

The range of scores for compliance with not eating salty foods was 2.0 to 7.0 (Table 8). Eleven subjects (37%) rated themselves 3.0 on compliance with not eating salty foods. The highest score was 7.0, indicating fair to poor compliance. The mean score was 3.8 (SD = 1.12). The subjects rated themselves less compliant with limiting salty foods than with adding salt to food.
Table 7. Self-rated compliance with not adding salt to food by frequency and percent (N = 30).

<table>
<thead>
<tr>
<th>Compliance Rate</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0-1.9</td>
<td>11</td>
<td>36.7</td>
</tr>
<tr>
<td>2.0-2.9</td>
<td>6</td>
<td>20.0</td>
</tr>
<tr>
<td>3.0-3.9</td>
<td>5</td>
<td>16.7</td>
</tr>
<tr>
<td>4.0-4.9</td>
<td>3</td>
<td>10.0</td>
</tr>
<tr>
<td>5.0-5.9</td>
<td>4</td>
<td>13.3</td>
</tr>
<tr>
<td>6.0</td>
<td>1</td>
<td>3.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>30</strong></td>
<td><strong>100.0</strong></td>
</tr>
<tr>
<td><strong>Mean</strong></td>
<td><strong>2.67</strong></td>
<td></td>
</tr>
<tr>
<td><strong>SD</strong></td>
<td><strong>1.62</strong></td>
<td></td>
</tr>
</tbody>
</table>

Table 8. Self-rated compliance with not eating salty foods (N = 30).

<table>
<thead>
<tr>
<th>Compliance Rate</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0-2.9</td>
<td>3</td>
<td>10.0</td>
</tr>
<tr>
<td>3.0-3.9</td>
<td>13</td>
<td>43.4</td>
</tr>
<tr>
<td>4.0-4.9</td>
<td>9</td>
<td>30.0</td>
</tr>
<tr>
<td>5.0-5.9</td>
<td>3</td>
<td>10.0</td>
</tr>
<tr>
<td>6.0-6.9</td>
<td>1</td>
<td>3.3</td>
</tr>
<tr>
<td>7.0</td>
<td>1</td>
<td>3.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>30</strong></td>
<td><strong>100.0</strong></td>
</tr>
<tr>
<td><strong>Mean</strong></td>
<td><strong>3.77</strong></td>
<td></td>
</tr>
<tr>
<td><strong>SD</strong></td>
<td><strong>1.12</strong></td>
<td></td>
</tr>
</tbody>
</table>
Urine Chloride

To determine the usefulness of overnight collections in measuring dietary salt intake, studies have demonstrated positive correlations between 24-hour and overnight urine sodium (Knulman et al., 1988; Liu et al., 1979; Ogawa, 1986; Watson and Langford, 1970) and chloride (Kaplan et al., 1982; Jeffery et al., 1987; Pietinen et al., 1976). However, two studies found that overnight urine collections were not practical in measuring sodium chloride intake (Luft et al., 1982; Tuomilehto et al., 1985). Luft et al. (1982) found that in free-living people, only 24-hour urine collection was useful in determining chloride intake. Tuomilehto et al. (1985) concluded that overnight collections for sodium measurement is only useful when sodium intake is maintained at a constant level.

Researchers of three studies concluded that overnight urine chloride specimens could determine compliance with a sodium-restricted diet (Luft et al., 1982; Luft et al., 1983; Pietinen et al., 1976). Luft et al. (1983) found that overnight urine collection was 79% reliable in testing compliance with a low-salt diet. Dietary compliance of people restricted to 65 mEq of sodium per day could be determined with two nocturnal urine chloride concentrations ≤ 10 mEq. Dietary compliance in subjects restricted to 110 mEq of sodium per day could be determined with two nocturnal urine chloride concentrations ≤ 20 mEq.

In this study, the average three-day urine chloride concentration ranged from 21.4 to 116.7 mEq/l (0.125 to 0.682% NaCl) of chloride. The average of the average three-day urine chloride concentration was 64.5 mEq/l (0.377% NaCl). No average urine chloride had concentrations of 20
mEq or less. According to the criteria set forth by Luft et al. (1983), this indicates that all subjects were noncompliant with a moderate sodium-restricted diet. Two individual urine specimens (from two different subjects) were below the 20 mEq urine chloride concentration determination for compliance.

Findings and Discussion Based on the Research Questions

The first research question was "What is the relationship between the total score of the health beliefs concept (resusceptibility, severity, and benefits) and compliance with a sodium-restricted diet?" There were no statistically-significant relationships between the total HBQ and the dependent variables (Table 9). There were two statistically nonsignificant but substantively interesting relationships between the total HBQ and salty foods ($r = 0.24$) and between the total HBQ and urine chloride ($r = 0.22$). As health beliefs (perceived resusceptibility to hypertension, perceived severity of hypertension, and perceived benefits of antihypertension treatment) increased, compliance with salty foods decreased and urine chloride concentrations increased.

The second research question was "What is the relationship between perceived resusceptibility of hypertension and compliance with a sodium-restricted diet?" There were no statistically-significant correlations between perceived resusceptibility to hypertension and the compliance measures (Table 10).

The third research question was "What is the relationship between perceived severity of hypertension and compliance with a sodium-restricted diet?" There were no statistically-significant correlations between perceived severity of hypertension and the compliance measures (Table 10).
Table 9. Correlations between the total HBQ and the compliance measures.

<table>
<thead>
<tr>
<th></th>
<th>Urine Chloride</th>
<th>Added Salt</th>
<th>Salty Foods</th>
<th>Dietary Recall</th>
<th>BP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total HBQ</td>
<td>.22</td>
<td>.09</td>
<td>.24</td>
<td>.07</td>
<td>.03</td>
</tr>
</tbody>
</table>

p < 0.05

Table 10. Correlations between perceived resusceptibility to hypertension and the compliance measures.

<table>
<thead>
<tr>
<th></th>
<th>Urine Chloride</th>
<th>Added Salt</th>
<th>Salty Foods</th>
<th>Dietary Recall</th>
<th>BP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived Resusceptibility</td>
<td>-.09</td>
<td>-.03</td>
<td>.09</td>
<td>.00</td>
<td>.04</td>
</tr>
</tbody>
</table>

p < 0.05
diet?" There were no statistically-significant correlations between perceived severity of hypertension and the compliance measures (Table 11).

The fourth research question was "What is the relationship between perceived benefits of antihypertension treatment and compliance with a sodium-restricted diet?" There were statistically-significant relationships found between perceived benefits of antihypertension treatment and two of the dependent variables (Table 12). Perceived benefits of antihypertension treatment correlated positively with urine chloride ($r = 0.41$) and blood pressure ($r = 0.35$). The belief that treatment for hypertension is beneficial increases with increased urine chloride concentrations and higher blood pressure.

It would be expected that an increase in the belief that antihypertension treatment is beneficial would be associated with a decrease rather than an increase in urine chloride and blood pressure. In this study, 90% of the subjects had normal diastolic blood pressures. Perhaps subjects felt that they could eat more salt because their blood pressures were normal. If this is true, a normal blood pressure would be a reinforcement for dietary noncompliance.

The fifth research question was "What is the relationship among the compliance measures of blood pressure, urine chloride, questionnaire, and dietary recall?" There were three statistically-significant relationships among the compliance measures (Table 13). Urine chloride positively correlated with added salt ($r = 0.44$), salty foods ($r = 0.44$), and blood pressure ($r = 0.45$). Noncompliance with added salt and salty foods is associated with increased urine chloride concentrations.
Table 11. Correlations between perceived severity of hypertension and the compliance measures.

<table>
<thead>
<tr>
<th></th>
<th>Urine Chloride</th>
<th>Added Salt</th>
<th>Salty Foods</th>
<th>Dietary Recall</th>
<th>BP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived Severity</td>
<td>.02</td>
<td>-.15</td>
<td>-.03</td>
<td>.10</td>
<td>-.17</td>
</tr>
</tbody>
</table>

p < 0.05

Table 12. Correlations between perceived benefits of antihypertension treatment and the compliance measures.

<table>
<thead>
<tr>
<th></th>
<th>Urine Chloride</th>
<th>Added Salt</th>
<th>Salty Foods</th>
<th>Dietary Recall</th>
<th>BP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived Benefits</td>
<td>.41*</td>
<td>.14</td>
<td>.24</td>
<td>.18</td>
<td>.35*</td>
</tr>
</tbody>
</table>

*p < 0.05
### Table 13. Correlations among the compliance measures.

<table>
<thead>
<tr>
<th></th>
<th>Urine Chloride</th>
<th>Added Salt</th>
<th>Salty Foods</th>
<th>Dietary Recall</th>
<th>BP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urine Chloride</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Added Salt</td>
<td>.44*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salty Foods</td>
<td>.44*</td>
<td>.24</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dietary Recall</td>
<td>.27</td>
<td>.13</td>
<td>-.10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BP</td>
<td>.45*</td>
<td>-.19</td>
<td>.12</td>
<td>.30</td>
<td></td>
</tr>
</tbody>
</table>

*p < 0.05
As a direct method of compliance measurement, urine chloride is considered to have greater validity than indirect measures (Feinstein, 1974; Gordis, 1979). The indirect measures of compliance (added salt, salty foods, dietary recall, and blood pressure) were compared to urine chloride for measurement validation.

The finding that urine chloride positively correlated with added salt and salty foods indicated that self-rating may be a sensitive indirect measurement of compliance. Even though blood pressure and urine chloride correlated in the expected direction, it does not necessarily indicate that blood pressure is a reliable or sensitive measurement of dietary compliance. The subjects' normal diastolic blood pressure readings may have been a result of antihypertension medication.

Urine chloride and dietary recall had a strong but statistically nonsignificant \((r = 0.27)\) correlation. Increased concentrations of urine chloride were associated with increased ingestion of sodium. Though statistically nonsignificant, this correlation may reflect the accuracy of the subjects' dietary recall. Jeffery et al. (1987) found that urine chloride did not correlate highly with a previous day's dietary recall. They suggested that five days of overnight urine samples would be required to estimate habitual sodium intake to within \(\pm 25\) mEq.

Blood pressure and dietary recall also had a strong but statistically nonsignificant correlation \((r = 0.30)\). As blood pressure increased, the milligrams of sodium consumed also increased.

The sixth research question was "What health beliefs (total score, resusceptibility, severity, or benefits) are significant predictors of
Multiple regression was used to answer this question. The total score of the HBQ was not placed into the regression analysis because it did not have statistically-significant Pearson's correlation coefficients with the compliance measures. The subscales of the HBQ and some of the demographic variables (age, education, and length of time with hypertension) were placed into the multiple regression equations. None of the HBQ subscales were statistically-significant predictors of compliance. Among the demographic variables, only age was a statistically-significant predictor, accounting for 12% of compliance.

The seventh research question was "What do clients perceive as barriers to compliance with a sodium-restricted diet?" A qualitative research method was used to answer this research question (Table 14). Subjects were asked to complete the sentence, "It is difficult to follow my low-salt diet because _________________________________." Some subjects gave more than one reason why it was difficult to follow a low-salt diet. The responses were compared and clustered into nine groups. These nine groups of responses were compared and reduced into four final categories.

The most frequent response to why it is difficult to follow a low-salt diet was that it is difficult to control the amount of salt in restaurant foods. The second most frequent response was that processed foods contain a lot of salt, making restricted salt intake difficult. These two responses were considered to be related because subjects felt a lack of control of salt in foods that were prepared by other people.
Table 14. Subjects' perceived barriers to a sodium-restricted diet.

<table>
<thead>
<tr>
<th>Initial Categories</th>
<th>Final Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eating out (11)</td>
<td>No control of salt in prepared foods</td>
</tr>
<tr>
<td>Processed foods (6)</td>
<td></td>
</tr>
<tr>
<td>Like salt on certain foods (5)</td>
<td>Desire for salt</td>
</tr>
<tr>
<td>Salt increases flavor of food (5)</td>
<td></td>
</tr>
<tr>
<td>Favorite foods are salty (5)</td>
<td></td>
</tr>
<tr>
<td>Likes salt (1)</td>
<td></td>
</tr>
<tr>
<td>Hard to change habit of salt (1)</td>
<td>Addictive behavior</td>
</tr>
<tr>
<td>Food binges (1)</td>
<td></td>
</tr>
<tr>
<td>Need salt in hot weather (2)</td>
<td>Beliefs about salt</td>
</tr>
</tbody>
</table>
The responses were reduced into the category, no control of salt in prepared foods.

A second category was created by clustering similar responses about the desire for salt and salty foods. Subjects reported difficulty limiting salt use when eating certain foods. Examples of responses were, "Some foods I do not like to eat without salt" and "I like to add salt to an egg." Five subjects said that salt increased the flavor of food, thereby making it difficult to limit salt use. Favorite foods which happened to be salty were reported as barriers to compliance. One subject simply admitted that he liked salt. The responses of liking salt with certain foods, using salt to flavor foods, having favorite salty foods, and liking salt were clustered into the category, desire for salt.

One subject reported that she went on eating binges and, as a consequence, ate more salty foods during her binges than when she ate normally. Another subject responded that, "It is hard to change any habit you've had for a long time." These two responses were categorized as addictive behavior.

Two similar responses were, "I sweat profusely much of the time and do not feel well on a very low-salt diet" and "... I suffer from excessive heat; my doctor advises me to use a little salt." These were labeled as beliefs about salt.

The barrier of not being able to control salt in prepared foods corresponds to the quantitative self-rating of compliance with salty foods. Subjects reported less compliance with salty foods than with added
salt, giving support to the qualitative finding that prepared foods are a barrier to compliance.

Presentation and Discussion of Additional Findings

Two of the HBQ subscales, perceived resusceptibility to hypertension and perceived benefits of antihypertension treatment, positively correlated ($r = 0.41$) with each other. As the perception of resusceptibility to hypertension and its complications increases or decreases, so does the perception that treatment is beneficial.

Perceived benefits of antihypertension treatment significantly and negatively correlated with age ($r = -0.32$) and marital status ($r = -0.32$). As age increases, perceived benefits of antihypertension treatment decreases. The younger subjects perceived treatment as more beneficial than the older subjects. Married subjects also perceived treatment as more beneficial than unmarried subjects.

Perceived benefits of antihypertension treatment correlated with income positively and with statistical significance ($r = 0.40$). Subjects with higher incomes perceived antihypertension treatment as beneficial. Although it was statistically nonsignificant, perceived benefits of antihypertension treatment had a strong positive correlation with education ($r = 0.28$).

Summary

The demographic characteristics of the study population were presented. The poor reliability of the HBQ may have been caused by the
small variance in the scores. The indirect measurements of compliance (added salt, salty foods, dietary recall, and blood pressure) indicated that most subjects complied with a moderate sodium-restricted diet. However, the direct measure of compliance (urine chloride) indicated that subjects were noncompliant.

There were two statistically-significant correlations between the HBQ and the compliance measures. Perceived benefits of antihypertension treatment correlated positively with urine chloride and blood pressure. There were three statistically-significant relationships among the compliance measures. Urine chloride positively correlated with added salt, salty foods, and blood pressures. The only variable that predicted compliance was age, accounting for 12% of compliance. Four barriers to compliance with a sodium-restricted diet were identified.
CHAPTER FIVE

FINDINGS RELATED TO THE CONCEPTUAL FRAMEWORK, LIMITATIONS, AND RECOMMENDATIONS

Chapter Five presents the research findings and discussion related to the conceptual framework. Limitations of the study are discussed. Implications for nursing practice and future nursing research are presented.

Findings and Discussion Related to the Conceptual Framework

In this study, no statistically-significant relationship was found between the total score of the Health Beliefs Questionnaire and compliance with a sodium-restricted diet. The finding of Tirrell and Hart (1980), that a statistically-significant relationship did not exist between health beliefs and compliance with an exercise program, supports the finding of this study. Contrary to the above, however, two other studies found that health beliefs is related to skin care compliance (Dai and Catanzaro, 1987) and medication compliance (Kelly et al., 1987).

A statistically-significant relationship between the health belief of perceived resusceptibility to hypertension and compliance with a sodium-restricted diet was not found. This result is consistent with findings from several studies. For example, relationships were not found between perceived resusceptibility to hypertension and medication compliance (Hershey et al., 1980; Nelson et al., 1978). Dai and Catanzaro (1987) were unable to associate resusceptibility to pressure sores and compliance with a skin care regimen in paraplegic patients. Andreoli
(1981), Cronin (1986), and DeVon and Powers (1984) found no difference in perception of resusceptibility to hypertension between compliant and noncompliant subjects.

Kirscht and Rosenstock (1977) found mixed results when differentiating between subjects with low and high levels of perceived susceptibility to the effects of hypertension. They found that subjects with higher levels of perceived susceptibility were better compliers. However, perceived susceptibility and compliance with diet (sodium restriction and weight loss) did not significantly relate in either high or low compliers.

The result of this study, that a statistically-significant relationship was not found between resusceptibility to hypertension and compliance with a sodium-restricted diet, however, did not concur with several studies which reported a statistically-significant relationship between perceived resusceptibility to illness and compliance with treatment. For example, resusceptibility to illness has been associated with appointment keeping (Elling et al., 1960; Becker et al., 1974), medication compliance (Elling et al., 1960; Becker et al., 1974; Becker et al., 1978; Kelly et al., 1987), and dietary compliance (Cummings et al., 1982).

In this study, perceived severity of hypertension was not significantly related to compliance with a sodium-restricted diet. Several studies substantiate this finding. Studies have failed to find a statistically-significant relationship between perceived severity of illness and compliance with physician anti-smoking advice (Pederson et al., 1984) and exercise (Tirrell and Hart, 1980). Hershey et al. (1980)
were unable to find a statistically-significant relationship between perceived severity to hypertension and treatment compliance. Andreoli (1981), Cronin (1986), and DeVon and Powers (1984) did not find a difference in perceived severity of hypertension between compliant and noncompliant subjects. However, other studies found statistically-significant relationships between perceived seriousness of illness and compliance with antihypertensive medication (Nelson et al., 1978), antibiotic medication (Becker et al., 1974; Becker et al., 1978), a skin care regimen (Dai and Catanzaro, 1987), and dietary restriction in peritoneal dialysis patients (Hume, 1984).

Perceived benefits of antihypertension treatment significantly correlated with two of this study's compliance measures (urine chloride and blood pressure) of a sodium-restricted diet. However, the direction of the correlations was opposite of that expected, suggesting that a normal blood pressure reading may reinforce dietary noncompliance. Noncompliance with sodium restriction is likely to result in increased urine chloride. No hypertension studies that were reviewed found statistically-significant relationships between perceived benefits of hypertension treatment and compliance. Studies of other kinds of compliance, however, have found that perceived benefits of treatment were associated with dietary compliance (Cummings et al., 1982), antibiotic medication (Becker et al, 1974), and compliance with a skin care regimen (Dai and Catanzaro, 1987).

Health beliefs and compliance with hypertension treatment has been studied in many different types of populations. Most of the subjects (N
studied by Cronin (1986) were poor (76.3%), black (68%), and had less than a high school education (71%). Their ages ranged from 30 to over 65 years old. The majority of the subjects were female (73.7%) and unmarried (68.4%). DeVon and Powers (1984) used a population (N = 30) that was largely comprised of well-educated, middle- to upper-income white people with an average of 55 years old. Andreoli (1981) studied 71 hypertensive males ranging in age from 30 to 74 years old. Most of the subjects (N = 121) studied by Hershey et al. (1980) were poor (50% with yearly incomes <$5,000), black (92%), and female (80%). The study population of Nelson et al. (1978) consisted of 142 subjects, of which 69% were female. Whites comprised 46% and blacks comprised 54%. The majority of the subjects were between 50 and 64 years of age. Kirscht and Rosenstock (1977) studied 123 subjects with a median family income of $12,000 per year. Most were female (60%), married (83%), and employed (95%). The median age was between 50 and 59 years old. Compared to the majority of the studies above, the subjects in this study were older (mean age 68), wealthier (57% had incomes >$20,000), and better educated (70% completed high school).

The findings of this study do not support a strong relationship between health beliefs and compliance with a sodium-restricted diet. There were no relationships found between a total HBQ score, perceived resusceptibility to hypertension, perceived severity of hypertension, and sodium-restricted dietary compliance. The relationship found between perceived benefits of antihypertension treatment and urine chloride and blood pressure suggested that a normal blood pressure reading may
reinforce dietary noncompliance. There is mixed support in the literature that health beliefs may explain compliance. Among studies using hypertensive people, the literature offers little support that health beliefs may explain compliance behavior. The inability of this study and other studies to find a strong relationship between health beliefs and compliance with antihypertension treatment suggests that the HBM may not be useful in explaining compliant and noncompliant behavior. However, the lack of reliable and valid instrumentation in this study to test health beliefs must be considered in any conclusion about the usefulness of the HBM. The results of this study may have been different if the HBQ had greater validity and reliability.

Andreoli (1984), Cronin (1986), and DeVon and Powers (1984) concluded that health beliefs may not be a useful factor in differentiating between compliant and noncompliant hypertensive patients. Andreoli (1981), Cronin (1986), DeVon and Powers (1984), and Taylor (1979) questioned the utility of measures based on the Health Beliefs Model to predict compliance in hypertensive patients. This study's results did not refute their conclusions about the usefulness of the HBM to predict compliance.

Added salt, salty foods, blood pressure, and urine chloride had statistically-significant positive relationships. Hilbert (1985) and Craig (1985) concluded that self-report through interviews could, with substantial reliability, classify patients as compliant and noncompliant. This study indicated that self-report through the use of analog scales may be a sensitive indirect compliance measurement.
However, there was confusion in this study between classification of the subjects' compliance with the direct measure of urine chloride and the indirect measures of self-report, dietary recall, and blood pressure. The direct measure, urine chloride, indicated that all of the subjects were noncompliant, while the indirect measures, dietary recall, blood pressure, and self-report, indicated that most subjects were compliant. In addition, urine chloride did not correspond with the subjects' self-report of compliance with not adding salt to food or eating salty foods. The significant correlations between the direct measure of urine chloride and the indirect measures of added salt and salty foods indicated that self-report using an analog scale was a sensitive measurement. The data suggest that self-report of added salt and salty foods may be a sensitive measure but is less accurate than urine chloride. This concurs with earlier conclusions that direct compliance measures have greater validity than indirect compliance measures (Feinstein, 1974; Gordis, 1979).

Health beliefs were not found to be predictive of compliance. Accounting for 12%, age was the only predictor of compliance. Schatz (1988) indicated that the HBM could be used to predict compliance in her study of health beliefs between compliant and noncompliant diabetics. In a prospective study, Taylor (1979) found that perceived severity of hypertension and medication compliance were associated after six and 12 months of treatment. However, he concluded that health beliefs developed along with compliance behavior and were not predictive of compliance.

The health belief of perceived barriers was investigated qualitatively in this study to discover what barriers subjects perceived when
complying with a low-salt diet. The perceived barriers identified were no control of salt in prepared foods, desire for salt, addictive behavior, and beliefs about salt. There was no examination of the relationship between perceived barriers to a sodium-restricted diet and compliance. Unlike this study, no other study qualitatively analyzed perceived barriers to treatment. However, some correlational studies demonstrated a statistically-significant positive relationship between barriers to action and compliance with medication (Becker et al., 1974; Hershey et al., 1980; Kelly et al., 1987), appointment keeping (Becker et al., 1974), and exercise (Tirrell and Hart, 1980). Two studies found a negative relationship between perceived barriers to action and compliance (Becker et al., 1978; Dai and Catanzaro, 1987).

Study Limitations

The HBQ scale range was limited, and the HBQ had low reliability and only content validity. The HBQ did not discriminate well among the individual subjects. Cronin (1986) also reported this limitation of the HBQ in her study. The compliance questionnaire (added salt and salty foods) was not tested for reliability and validity.

Dietary recall is a crude measure of sodium intake. A dietary recall is based on estimated food portions reported by the subjects. Because the subjects were free to alter their diets, they may have manipulated their salt intake simply because they were aware of what they were eating or because they knew that the sodium levels would be
calculated. A change in their normal diets may have influenced the dietary recall, decreasing its reliability.

A limitation of the study was that many subjects were treated concurrently with medication and diet. Hypertension controlled with medication may be a reinforcement of dietary noncompliance. Therefore, blood pressure may not be a true measure of compliance.

The small sample size limits the generalization of these results. A larger sample size may have resulted in a more heterogeneous sample. Because the subjects were recruited from a wellness program, they may have tended to be homogenous in their beliefs and behaviors. The subjects were volunteers; people who had different health beliefs or were less or more compliant may have declined to participate in the study.

Implications for Nursing Practice

A client's self-report of compliance using analog scales may be a sensitive indirect measurement, but it is likely to be less accurate than a direct compliance measurement. The utilization of self-report and other indirect compliance measures is relevant in nursing practice because laboratory values are not always available. However, nurses should be cautious in diagnosing noncompliance utilizing results from indirect compliance measurements.

A routine assessment of attitudes and beliefs can help nurses to tailor interventions for their clients (Janz, 1988). Perceived barriers to compliance with a sodium-restricted diet need to be included in the assessment of hypertensive patients. Perceived barriers have implications
in the success of any dietary prescription. In this study, subjects identified prepared foods and favorite salty foods as barriers to compliance. Clients who rely heavily on prepared foods may be hindered in their attempts to eat less salt. Clients who have favorite salty foods may, likewise, find it difficult to give up eating these foods. Unless nurses are aware of these difficulties, intervention with noncompliant behavior may be unsuccessful.

An assessment of the client's attitudes, beliefs, and living situation can help nurses choose effective educational interventions. Teaching clients how to shop for low-salt foods, how to eat out in restaurants, and how to cook tasty low-salt recipes may enhance compliance with a sodium-restricted diet. Client instruction about the minimum daily requirement of sodium (400 mg) and the average American daily intake of sodium (6,000-10,000 mg) may dispel mistaken beliefs about how much salt is needed for health (Houston, 1985).

Addictive behavior was identified as a barrier to a sodium-restricted diet. The physiological problem of hypertension is intertwined with the behavioral problem of addiction. An assessment of eating difficulties may reveal a problem with food addiction which would hinder compliance. Addictive behavior may influence the success of any nursing intervention utilized in the treatment of dietary noncompliance. Efforts to treat noncompliance may be wasted if the client's problem is addiction. Treatment of addictive behavior may be different than treatment for noncompliance.
Implications for Future Nursing Research

Janz (1988) stated that perceived barriers are probably the most poorly defined of the HBM dimensions. This study did not exhaust the possible perceived barriers that subjects may encounter in their attempts to comply with a sodium-restricted diet. Research is needed to investigate other perceived barriers which hinder compliance with a low-salt diet. Further research about perceived barriers to diet may reveal that the barriers are similar no matter what type of diet is prescribed.

Janz (1988) suggested that further research is needed to evaluate the efficacy of interventions intended to alter beliefs and, subsequently, behavior. If this is to be done using hypertensive subjects, there is a need for reliable and valid tools to measure health beliefs about hypertension. The HBQ has not been tested for validity, and its reliability based on this study's data is questionable.

Summary

This study attempted to examine the relationship between health beliefs, based on the Health Beliefs Model, and compliance with a sodium-restricted diet. The health belief variables and some of the demographic variables were placed into multiple regression analysis to identify what variables predicted compliance. The relationships among the compliance variables were investigated. A qualitative investigation to identify perceived barriers to a sodium-restricted diet was conducted.

There were no statistically-significant relationships found between a total HBQ score, perceived resusceptibility to hypertension, and
perceived severity of hypertension. Perceived benefits of antihypertension treatment had a significant positive correlation with urine chloride and blood pressure, suggesting that when blood pressure is normal, dietary noncompliance is reinforced. In this study, none of the health belief variables significantly predicted compliance. A conclusion of other studies (Andreoli, 1981; Cronin, 1986; DeVon and Powers, 1984; Taylor, 1979) that health beliefs may not be useful in predicting compliance in hypertensive patients could not be refuted by this study.

Urine chloride significantly correlated with blood pressure and the self-reported measures of added salt and salty foods. The direct compliance measure of urine chloride indicated that the subjects were noncompliant, while the indirect measures of added salt and salty foods indicated that most clients were compliant. This indicated that self-report using analog scales may be a sensitive measurement of compliance, but is less accurate than urine chloride.

The perceived barriers to a sodium-restricted diet, no control of salt in prepared foods, desire for salt, addictive behavior, and beliefs about salt indicated that assessment of perceived barriers would assist nurses in effectively intervening with noncompliant behavior. Further research is needed to expand the list of perceived barriers identified in this study.

Study limitations included low reliability and validity of the HBQ and compliance questionnaire and dietary recall, a small sample size, and a volunteer sample. Another limitation was that concurrent medication treatment for hypertension may have reinforced dietary noncompliance.
APPENDIX A

HUMAN SUBJECTS APPROVAL
The University of Arizona
Human Subjects Committee
1690 N. Warren Bldg. 526B
Tucson, Arizona 85724
(602) 626-6721 or 626-7575

23 January 1989

Mary A. Welch
4073 E. 3rd Street
Tucson, Arizona 85711

RBl A89.01 A CORRELATION STUDY OF HEALTH BELIEFS AND COMPLIANCE WITH A SODIUM RESTRICTED DIET

Dear Ms. Welch:

We received the revised consent form and documentation regarding the consent form storage site for your above cited project. The procedures to be followed in this study pose no more than minimal risk to participating subjects. Regulations issued by the U.S. Department of Health and Human Services [45 CFR Part 46.110(b)] authorize approval of this type project through the expedited review procedures, with the condition(s) that subjects' anonymity be maintained. Although full Committee review is not required, a brief summary of the project procedures is submitted to the Committee for their endorsement and/or comment, if any, after administrative approval is granted. This project is approved effective 23 January 1989.

The Human Subjects Committee has noted the possible enrollment of some research subjects at sites other than at the University of Arizona and/or under immediate supervision of non University of Arizona personnel. Please be reminded that you as the Principal Investigator are committed by reason of the Committee's approval of this protocol to insure that all basic elements of protection from research risks are extended to all subjects wherever located at community sites and attended therein by non-University of Arizona personnel. The Institutional Review Board is in compliance with the requirements of Part 56 Subchapter D, Part 312 of the 21 Code of Federal Regulations published January 27, 1981.

Approval is granted with the understanding that no changes or additions will be made either to the procedures followed or to the consent form(s) used (copies of which we have on file) without the knowledge and approval of the Human Subjects Committee and your College or Departmental Review Committee. Any research related physical or psychological harm to any subject must also be reported to each committee.

A university policy requires that all signed subject consent forms be kept in a permanent file in an area designated for that purpose by the Department Head or comparable authority. This will assure their accessibility in the event that university officials require the information and the principal investigator is unavailable for some reason.

Sincerely yours,

Milan Novak, M.D., Ph.D.
Chairman
Human Subjects Committee

cc: Departmental/College Review Committee
December 19, 1988

Mary A. Welch R.N., A.N.P.
Graduate Student
College of Nursing
University of Arizona
Tucson, Arizona

Dear Mary,

Your project, A Correlational Study of Health Beliefs and Compliance with a Sodium Restricted Diet, has been reviewed by Nursing Administration at St. Mary's Hospital and Health Center. Inasmuch as your project will require subjects to complete questionnaires, allow collection of urine samples, and submit to blood pressure readings, no further review will be required. You may proceed with the knowledge that you will have our full support and cooperation.

Sincerely,

Sherry Collins, R.N., M.S.N.
Administrative Director
Critical Care Services
APPENDIX B

CONSENT FORM
A Correlational Study of Health Beliefs and Compliance with a Sodium Restricted Diet

YOU ARE ASKED TO READ THE FOLLOWING MATERIAL TO ENSURE THAT YOU ARE INFORMED OF THE NATURE OF THIS RESEARCH STUDY AND OF HOW YOU WILL PARTICIPATE IN IT. IF YOU CONSENT TO DO SO. SIGNING THIS FORM WILL INDICATE THAT YOU HAVE BEEN SO INFORMED AND THAT YOU GIVE YOUR CONSENT. FEDERAL REGULATIONS REQUIRE WRITTEN INFORMED CONSENT PRIOR TO PARTICIPATION IN THIS RESEARCH STUDY SO THAT YOU CAN KNOW THE NATURE AND THE RISKS OF YOUR PARTICIPATION AND CAN DECIDE TO PARTICIPATE OR NOT PARTICIPATE IN A FREE AND INFORMED MANNER.

"I am being invited to voluntarily participate in the above-titled research project. The purpose of this project is to learn about peoples' beliefs about high blood pressure and their compliance with a low salt diet."

"I have been invited to participate because, I (1) have had high blood pressure for at least six months, (2) have not had any changes in my blood pressure medication during the last month, (3) am on a low salt diet that limits added salt and salty foods, and (4) am not taking potassium chloride medication. Twenty to thirty subjects will be enrolled in this study."

"If I do not want to participate in the study, my care at the Nursing Wellness Center will not be affected. I will continue to receive the services that are usually offered."

"If I agree to participate, I will be asked to:
1. answer three questionnaires that will take about 20 minutes to complete,
2. collect three overnight urine samples to test for salt in my urine (equipment will be provided free of charge),
3. write down everything I eat for one day (dietary recall),
4. allow three home visits (by appointment) from the nurse researcher lasting approximately 15 to 20 minutes each,
5. allow the nurse researcher to take a blood pressure reading, pick up the urine, and review the dietary recall during the home visits."

"I understand that there is no risk to me by participating in this project."

"Benefits to me include the results of three blood pressure readings, a computer analysis of my dietary recall, and the results of the free urine tests."

"I understand that all information will be kept confidential and that my name will not be used. The research results and personal information about me will be shared with me if I request. Mary Welch R.N., A.N.P. will have access to the research findings and data. Special equipment to test salt in urine samples has been provided by Environmental Test Systems, Inc. A copy of the final research report will be sent to this company. Individuals will not be identified in the final research report."
"There is no cost to me to participate in this project."

"I can obtain further information from Mary Welch, R.N., A.N.P. at 327-9235. If I have questions concerning my rights as a research subject, I may call the Human Subjects Committee office at 626-6721.

"BEFORE GIVING MY CONSENT BY SIGNING THIS FORM, THE METHODS, INCONVENIENCES, RISKS, AND BENEFITS HAVE BEEN EXPLAINED TO ME AND MY QUESTIONS HAVE BEEN ANSWERED. I UNDERSTAND THAT I MAY ASK QUESTIONS AT ANY TIME AND THAT I AM FREE TO WITHDRAW FROM THE PROJECT AT ANY TIME WITHOUT CAUSING BAD FEELINGS OR AFFECTING MY MEDICAL CARE. MY PARTICIPATION IN THIS PROJECT MAY BE ENDED BY THE INVESTIGATOR OR BY THE SPONSOR FOR REASONS THAT WOULD BE EXPLAINED. NEW INFORMATION DEVELOPED DURING THE COURSE OF THIS STUDY WHICH MAY AFFECT MY WILLINGNESS TO CONTINUE IN THIS RESEARCH PROJECT WILL BE GIVEN TO ME AS IT BECOMES AVAILABLE. I UNDERSTAND THAT THIS CONSENT FORM WILL BE FILED IN AN AREA DESIGNATED BY THE HUMAN SUBJECTS COMMITTEE WITH ACCESS RESTRICTED TO THE PRINCIPAL INVESTIGATOR, Mary Welch R.N., A.N.P., OR AUTHORIZED REPRESENTATIVE OF THE COMMUNITY HEALTH NURSING DEPARTMENT. I UNDERSTAND THAT I DO NOT GIVE UP ANY OF MY LEGAL RIGHTS BY SIGNING THIS FORM. A COPY OF THIS CONSENT FORM WILL BE GIVEN TO ME."

Subject's Signature ___________________________ Date ____________
APPENDIX C

INSTRUMENTS
Health Beliefs Questionnaire

Directions: The statements on this form are to help you describe what you believe about hypertension. Please read each item carefully, then put a check (✓) in the column that best describes your belief about the statement.

There is no right or wrong answer. Please answer all questions.

In this questionnaire hypertension means the same as high blood pressure.

<table>
<thead>
<tr>
<th></th>
<th>COMPLETELY FALSE</th>
<th>MOSTLY FALSE</th>
<th>PARTLY FALSE AND PARTLY TRUE</th>
<th>MOSTLY TRUE</th>
<th>COMPLETELY TRUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. IF A PERSON HAS HYPERTENSION, IT ONLY LASTS FOR A BRIEF PERIOD OF TIME.</td>
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<td>2. I BELIEVE I REALLY HAVE HYPERTENSION.</td>
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<td>3. HYPERTENSION CAN BE CURED SO IT WON'T COME BACK AGAIN.</td>
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<td>4. ONE CAN HAVE HYPERTENSION WITHOUT KNOWING IT.</td>
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<tr>
<td>5. I BELIEVE I WILL HAVE HYPERTENSION FOR THE REST OF MY LIFE.</td>
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<td>6. HYPERTENSION IS A MILD HEALTH PROBLEM.</td>
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<td>7. HAVING A BROKEN LEG IS MORE SERIOUS TO ONE'S HEALTH THEN HAVING HYPERTENSION.</td>
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<td>8. HAVING HYPERTENSION MEANS THAT ONE IS IN DANGER OF GETTING HEART TROUBLE.</td>
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</tr>
<tr>
<td></td>
<td>COMPLETELY FALSE</td>
<td>MOSTLY FALSE AND PARTLY TRUE</td>
<td>MOSTLY TRUE</td>
<td>COMPLETELY TRUE</td>
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<tr>
<td>9. HAVING THE FLU IS MORE SERIOUS TO ONE'S HEALTH THAN HAVING HYPERTENSION.</td>
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<tr>
<td>10. HAVING HYPERTENSION MEANS THAT ONE IS IN DANGER OF GETTING A STROKE</td>
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<tr>
<td>11. EATING SALT HELPS TO CONTROL HYPERTENSION.</td>
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<tr>
<td>12. CONTROLLING HYPERTENSION WITH TREATMENT HELPS LOWER ONE'S CHANCES OF GETTING KIDNEY DISEASE.</td>
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<td>13. THE LONGER ONE HAS HYPERTENSION WITHOUT TREATMENT, THE MORE DAMAGE IT CAN DO.</td>
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<tr>
<td>14. BEING OVERWEIGHT HELPS CONTROL HYPERTENSION.</td>
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<td>15. A PERSON WITH HYPERTENSION WILL LIVE LONGER IF HE OR SHE TAKES HYPERTENSION MEDICINE.</td>
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</table>
## Dietary Recall

<table>
<thead>
<tr>
<th>Type of food</th>
<th>Amount</th>
</tr>
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<tbody>
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<td></td>
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</tbody>
</table>
Barriers to Taking Action

Please complete the sentence below to describe the situations in which you usually add salt to your food or eat salty foods.

It is difficult to follow my low salt diet because:

__________________________________________

__________________________________________

__________________________________________

Sodium Restricted Diet

Please list below foods that are low in salt and foods that are high in salt.

Foods low in salt:

__________________________________________

__________________________________________

__________________________________________

Foods high in salt:

__________________________________________

__________________________________________

__________________________________________
Demographic Data

Directions: Fill in the blank or circle the answers that apply to you.

1. What is your age? ___________________________

2. Are you:
   1. Female
   2. Male

3. What is your marital status?
   1. Single (never married)
   2. Married
   3. Divorced
   4. Separated
   5. Common Law
   6. Widow (Widower)

4. What is your race?
   1. White
   2. Black
   3. Hispanic
   4. Oriental
   5. Native American
   6. Other __________________

5. What was the last grade you completed in school? ___________________________

6. Are you retired?
   1. Yes
   2. No
   If not What type of work do you do? ___________________________

7. What is your yearly income?
   1. under $5,000
   2. $5001-$10,000
   3. $10,000-$20,000
   4. $20,000-$30,000
   5. $30,000-$40,000
   6. over $40,000

8. How many years (or months) have you been treated for high blood pressure? ________________

9. Have you been instructed by your doctor or a dietician to:
   1. Not use table salt or add salt while cooking?
      a. yes
      b. no
   2. Not eat salty foods?
      a. yes
      b. no
Using the scales below, estimate how well you avoid adding salt to your food from the salt shaker (at the table or in cooking) and avoid eating salty foods (foods that taste salty).

1. Place an X along the line where you believe BEST represents how much salt you add to your food. Number one (1) means that you never add salt. Number ten (10) means that you always add salt.

2. Place an X along the line where you believe BEST represents how much salty foods you eat. Number one (1) means that you never eat salty foods. Number ten (10) means that you eat a lot of salty foods.
APPENDIX D

PERMISSION TO USE THE HEALTH BELIEFS QUESTIONNAIRE
Dear Dr. Andreoli:

I am a graduate student at the University of Arizona College of Nursing. I am beginning research in completion of a Master of Science degree.

I plan to investigate compliance with nonpharmacological treatment in elderly hypertensive clients. I will study the relationship among social support, health beliefs and compliance in clients who have been instructed to limit their intake of dietary sodium.

I would like to have a copy of your Health Beliefs Questionnaire and permission to use it in my research. Any information you have on the scale statistics, including reliability and validity, and reprints of any articles pertaining to this questionnaire would be appreciated.

If you are interested, I would be happy to discuss my research further and share my findings with you. I thank you for your help.

Sincerely yours,

Mary Welch RN, ANP

Mary A. Welch RN, ANP

7/18/88
LIST OF REFERENCES


Houston, M.C., 1985, Hypertension: examining dietary sodium as cause and therapy, *Consultant*, vol. 25, no. 8, pp. 235-245.


