Efficacy of the Behavior of Low-Salt Diets in People with High Blood Pressure: A Literature Review

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Abstract

Background: Low-salt dietary behavior is applied to regulate or control habits in salt intake every day in people with high blood pressure or hypertension.

Aim: To identify the form of low-salt dietary behavioral efficacy interventions, an instrument for measuring indicators and the effect of the behavior of low-salt diets on people with high blood pressure..

Method: Using electronic data bases in the search for articles from journals that have been published through PubMed, Cengage, ScienceDirect.

Results: After reviewing the article, it was found that the behavior of low-salt diet had an effect on increasing habits and self-efficacy on the use of salt according to dietary guidelines, contributing to a decrease in blood pressure, and quality of life related to health when compared with patients or groups who only received standard care. The instruments used are quite varied, related to the most widely used indicators of blood pressure measurement are the Sphygmomanometer model, and 24-hour urine indicators using a salt percentage meter (Compact salt meter) and 24-hour urine salt concentration (KME-03 Salinity checker and Atom Absorption Flame Spectrometry), self-efficacy (general measurement scale), self-care measurement (12-item knowledge of hypertension index) and health-related quality of life after discharge from hospital (SF-12 & The Kansas City Cardiomyopathy Questionnaire (KCCQ). Low-salt dietary behaviors also increase awareness of factors that influence adherence to low-salt diets, reduce systolic blood pressure, good blood pressure control status.

Conclusion: Increases self-efficacy, self-care, attention or focus, awareness of salt usage of less than 4 grams per day, intention to change habits / behavior adds salt more than 4 g per day when preparing or cooking food, as well as the effect of improving quality of life after get out of the hospital..

Keywords: Low-salt diet, self-efficacy, 24-hour urine, blood pressure, quality of life, high blood pressure

Background

One of the many conditions that can trigger cardiovascular disease is high blood pressure or hypertension. Hypertension itself has become the most common diagnosis in primary care systems in the United States where around 15,762 people with hypertension have visited disease control and prevention centers (CDC, 2015). Two-thirds of individuals aged 60 years experience hypertension and in individuals aged 75 years three-quarters experience systolic hypertension (The seventh report of the Joint National Committee on prevention, detection, and treatment of high blood pressure, 2004) .

The American Hearth Association (AHA), has identified that the importance of modifying lifestyles to avoid hypertension such as choosing a better diet, regular physical activity, stress management, reducing salt intake (sodium <1500mg / day), increase potassium intake of 3500-5000mg, adhering to prescribed drugs, social support, avoiding tobacco, limiting alcohol consumption, and maintaining a healthy weight

and regularly controlling blood pressure (AHA, 2016).

Diet guidelines according to the Food and Drug Administration (FDA) that salt intake per day is one teaspoon or equal to less than 2,300mg / day (U.S. FDA, 2018). Observational and intervention studies have shown that limiting salt intake from 3-5 grams per day can substantially reduce systolic blood pressure by 3.7-7.0 mmHg and diastolic BP 0.9-2.5 mmHg in hypertensive patients (He & MacGregor , 2009; O'Donnell, Mente, & Yusuf, 2014; Pimenta, et al., 2009). Sacks et al., (2001); and Vollmer et al., (2001) presented the results of a study from the Hallmark-Dietary Approaches to Stop Hypertension (DASH) that a person can avoid hypertension when applying a diet rich in fruits, vegetables, grains and low-fat foods, and applying Low-salt diets (1,500 mg of sodium recommended in old adulthood by US-FDA) can reduce blood pressure (AHA, 2017; Bolin, Horne, Crane, & Powell, 2018).

Excessive salt intake can affect the vascular, neurological, and hormonal components and reduce the ability of the kidneys to excrete water, thereby stimulating an increase in blood pressure. The worst impact is damage to vital organs (heart, kidneys) and it can run progressively if it is not monitored or managed properly and unhealthy living behavior. The percentage of deaths due to hypertension based on age range 45-64 years (34.7%), 65-74 years (51.6%), ≥ 75 years (57.5%), women (27.4%), and men (34.1%) (CDC, 2017). The results of research conducted by Chobanian & Hill (2000); Hollenberg (2006) and Jones (2004), have documented that there is a relationship and influence of sodium (salt) on blood pressure (Bolin et al., 2018). Salt restriction in hypertension management according to the guidelines of the Japanese Society of Hypertension (JSH, 2014) which recommends salt intake <6 g / day (Mancia et al., 2013; Shimamoto, Ando, Fujita, & et al., 2014).

Cornélio et al., (2012) said that intention or will is the main determinant in controlling additional salt when cooking ie less than 4g of salt / day, and that intention arises because of self-efficacy in salt usage habits (Ajzen, 1991 ; Bartholomew, Parcel, Kok, & Gottlieb, 2006). Good intentions and self-efficacy significantly increase in the use of salt per day of less than 4 grams and reduce the habit of using more than 4g of salt when preparing or processing food ingredients at home (M. E. Cornélio et al., 2012). Habit and self-efficacy are central variables associated with changes in behavior of adding salt during cooking (Cornélio et al., 2016). Although there is a strong intention or willingness but is not supported by healthy behavior, the health effects that are expected to be difficult to achieve. Currently access to information about health is increasingly easy to obtain and most people have known the bad consequences if they have high salt intake habits. Low-salt dietary behavior is applied to regulate or control daily salt intake habits in people with high blood pressure, but many of them still continue to consume high-salt foods (Ghimire, Shrestha, & Callahan, 2018). Therefore, the authors reviewed this literature with a population-based study approach in patients with high blood pressure or hypertension related to the effect or efficacy of the behavior of low-salt diets, and aims to increase the use of information in synthesizing empirically related research, thus helping in identifying : 1) Form of behavioral efficacy interventions (habits) related to low-salt diets; 2) Instruments to measure the behavior efficacy indicators of low-salt diets; 3) The effect of the behavior of a low-salt diet on people with high blood pressure.

Method

This literature review method also uses the PRISMA and Cochrane handbook guidelines (Moher et al., 2009), filtering articles detailed in the flow diagram (Figure 1 and Table 1). The search for articles was carried out comprehensively in studies published from January 2013 to August 2018 in the PubMed, Cengage, and ScienceDirect databases. For example, a search strategy for the efficacy of a low-salt diet in individuals with high blood pressure or hypertension at PubMed is ((Low-salt, Diet [Mesh] and (((High-blood pressure [Mesh] or Hypertension [Mesh])) and (((Efficacy [Mesh] or Self-efficacy [Mesh])). All searches are limited to journal articles that are full text, in English, pure research (non-literature, study protocol), ages ≥18 years to senior citizens (elderly). Then later specified again in an article that uses a Randomized controlled trial (RCT) design, has a comparison / control group, the main content is the efficacy of a low-salt diet in people with high blood pressure. The consensus was carried out together with the second author if the discrepancies were found when filtering titles and abstracts.

Results

After looking at the inclusion criteria, the article identified at the beginning of the search was 223 articles. Then screening double-published articles and published by (MEDLINE / PubMed, ScienceDirect, and Cengage) so that the article becomes 219. Then screening is done by looking at articles that are full text, in English, open access, and related articles found 71 articles. Screening and selection of articles that are relevant to the topic, so that there are 14 articles that are quite relevant, by looking at the abstract of each article and one of its considerations regarding population (object) research that comes from the population of hypertensive patients aged ≥18 years to elderly (elderly) and obtained there were 10 articles, out of 10 articles there were two protocol studies, one literature study and two non-randomized studies, five articles were included in the article (Figure 1). Researchers from the five selected articles were conducted in several countries such as Indonesia, the United States, Brazil and China. The research design used was a randomized controlled trial (RCT) (n = 5).

1.   A form of low salt diet intervention.

In this study there are several forms of interventions that differ from the five articles selected. Four of the five articles that have been studied, have interventions in the form of training skills, habits or behavior, and education (education and health promotion) on low-salt diets and then followed-up sometime in the future (Marilia E Cornélio et al., 2016; Irwan et al., 2016; Wang et al., 2015; Wessler, Maurer, & Hummel, 2016). Another intervention is alternative therapy (replacement therapy) in applying a low-salt diet in the form of the use of salt substitutes made from 65% sodium chloride, 25% potassium, and 10% magnesium (Zhou et al., 2013).

2.   Instruments and behavioral efficacy indicators for low salt diets

The most widely used indicator of blood pressure measurement instrument is the Sphygmomanometer model (Irwan et al., 2016; Wang et al., 2015; Zhou et al., 2013), and for measuring salinity indicators (sodium) in 24-hour urine is by using percentage measurement instruments and concentrates of salt content (Cornélio et al., 2015; Irwan et al., 2016; Wessler et al., 2016). Compact salt meter (salt content in food) and measurement of salt concentration in

participants' urine using the KME-03 Salinity checker (Irwan et al., 2016), Atom Absorption Flame Spectrometry (Cornélio et al., 2015). Research using pictorial media such as leaflets or pamphlets in education and practice / training, as well as dietitian involvement (Cornélio et al., 2015; Wessler et al., 2016). One article also used the Salsave test strip (Advantech Toyo Co., Fukuoka, Japan) which was used to evaluate the patient's salt taste threshold (Wessler et al., 2016). Sodium and potassium concentrations were measured in blood and urine using an ion selective electrode method (Zhou et al., 2013). For behavioral variables such as self-efficacy, behavior / habits, self-care (12-item knowledge index of hypertension), and intention, using a psychosocial scale instrument (Cornélio et al., 2015; Irwan et al., 2016; Wessler et al. , 2016) And of the five articles reviewed there was one article that also measured quality of life. "The Kansas City Cardiomyopathy Questionnaire (KCCQ)" uses SF-12, consisting of 23 self-administered items, assessing signs and symptoms of physical limitations, self-efficacy, disorders social, and health status related to overall quality of life (Wessler et al., 2016).

3.   Effect of low-risk dietary behavior on people with high blood pressure

Of the five articles reviewed, the duration of interventions provided ranged from two weeks to two years with various forms of intervention. Two articles did not take 24-hour urine measurements ((Wang et al., 2015; Zhou et al., 2013). One study used guidelines or protocols and nutritionists to direct interventional therapies to be carried out including explanation of each session's procedures and time estimates. each activity and ingredients used (Cornélio et al., 2015). One article also looked at other outcomes such as echocardiography, non-invasive vascular tests, oxidative stress markers, and salt taste sensitivity (Wessler et al., 2016). Another article, the implementation of a low-salt diet is seen from a number of behavioral / habitual items such as self-efficacy, self-care, the intention and habit of adding salt during cooking, as well as who prepares or processes food ingredients at home (Cornélio et al., 2015; Irwan et al., 2016; Wessler et al., 2016).

The results showed that the effect of low salt dietary behavior on hypertensive patients through health education as well as direct practice both in the long term and short term did not have a negative impact on patients with high blood

pressure or hypertension, but gave a positive influence on salt reduction and practice different, good self-efficacy in efforts to reduce salt intake and steps to limit the addition of salt when cooking (no more than 4 grams per day), quality of life after undergoing treatment in the hospital and the habit of preparing food menus according to the DASH program (Marilia E Cornélio et al., 2016; Irwan et al., 2016; Wang et al., 2015; Wessler et al., 2016). Low salt diet behavior in people with high blood pressure can control the habit of adding salt when cooking and increasing self-efficacy in the regulation of low-salt dietary intake (Marilia E Cornélio et al., 2016; Irwan et al., 2016; Wang et al., 2015; Zhou et al., 2013), as well as good habits in processing and preparing a low-salt diet menu whether it is in the community or in patients who are outpatient or have gone home (Marilia E Cornélio et al., 2016; Wessler et al., 2016). As for one research article that uses a low-salt diet where the salt used consists of sodium, potassium and magnesium, it is considered to have contributed to a greater effect of blood pressure than changes in blood pressure using only one womb (Zhou et al., 2013)
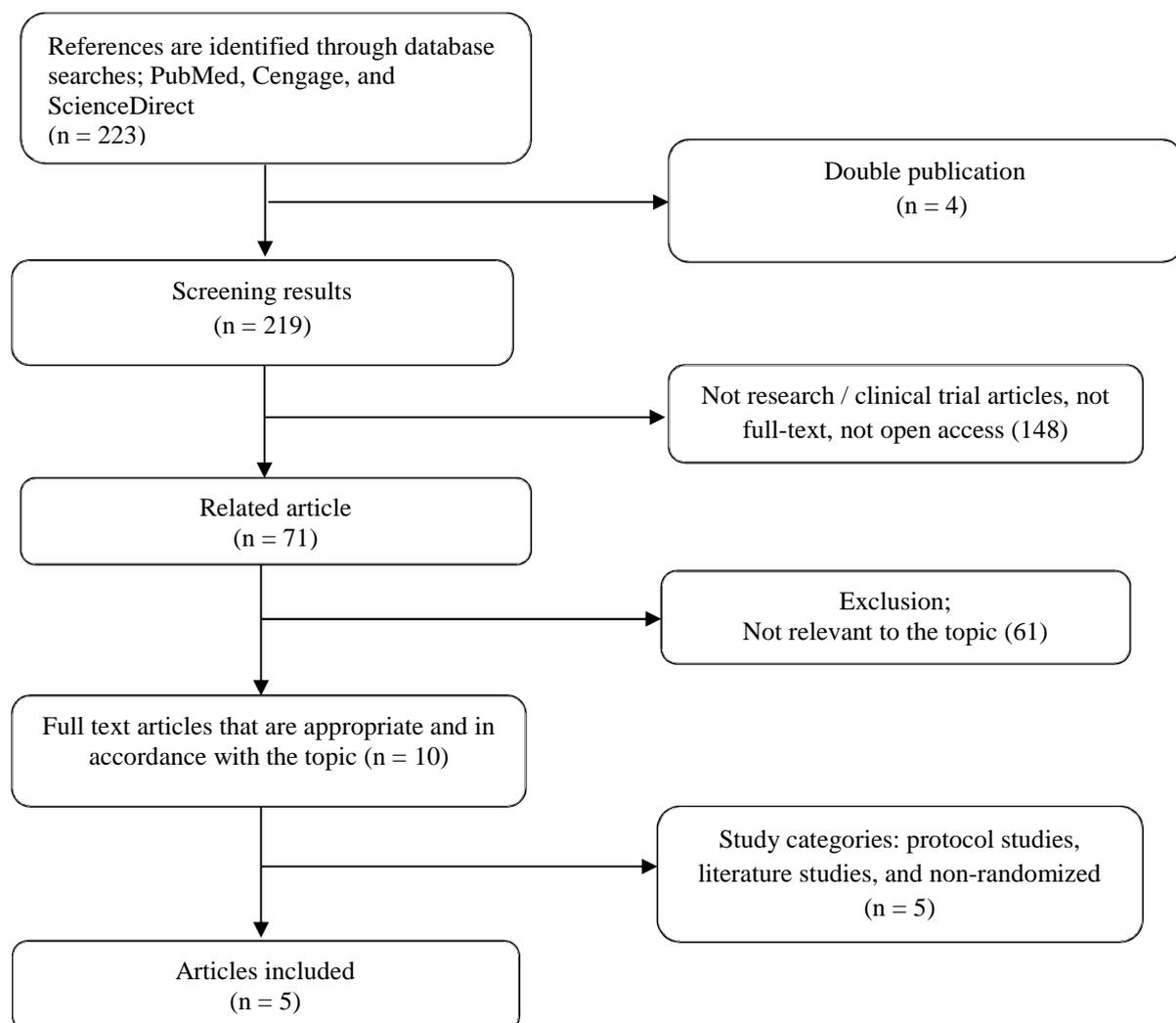
Figure 1: PRISMA Flow diagram

Table 1

Citation	Aim	Design/sample	Intervention	Instrument	Result	Limitation
(Irwan et al., 2016)	Examine the effectiveness of self-care interventions and the level of confidence in reducing and regulating salt intake among elderly hypertension in Indonesia	Randomized controlled trial (RCT), participants were divided into three groups: the control group (N = 17), the salt reduction exercise group or the salt-reduction training group (SRT) (N = 13), and the group maintaining salt-reduction efficiency. efficacy-maintenance (SREM) (N = 15)	SREM groups are given educational training and regular meetings to improve and regulate self-care and self-efficacy. The SRT group is given educational training to improve and regulate self-care and self-efficacy. The control group is not given any intervention. Monthly check-ups are provided as usual care for all participants (blood pressure measurement). Examination of salt levels through the secretion of morning urine (24-hour urine) .	Self-care measurement uses a 12-item knowledge of hypertension index (KHI). Assessment of attitudes towards self-care uses seven statements with 0–10cm visual analog scale. Measurement of self-care determination, percentage of salt content in food using Compact salt meter (LAQUAtwin; Horiba Scientific, Kyoto, Japan), and measurement of salt concentration in the urine of participants using KME-03 salinity checker (Kawano Me Lab, Yokohama, Japan) , has been validated and recommended by the Japanese Society of Hypertension for decreasing salt intake (Yasutake et al., 2013). Blood pressure was measured using Portable Muranaka Medical Instrument, Osaka, Japan sphygmomanometer and Littmann Classic Stethoscope (3M Science, St. Paul, Minnesota, USA). Measurement of body mass index (weight and height) (kg / m2). To determine the self-efficacy scale using the Indonesian version of the general cell-efficacy	Participants in the SRT group showed significant effects on the same variable. However, the concentration of salt in food increases after routine meetings. Non-significant increase was found in the control group. Participants from the SREM Group showed a positive effect on salt reduction and different practices were based on who prepared their food at home.	Although participants were randomly divided into three groups, a small sample size could influence the results of the study. Qualitative data is only taken from one routine meeting, and analyzed with the aim to describe the experience with a low-salt diet visually and with the number of words without producing any themes. In addition, the results of research in rural areas may be different from research conducted in urban areas.

				measurement scale (Schwarzer & Jerusalem, 1995)		
(Cornélio et al., 2015)	Test the impact of a theory-based intervention (SALdável Program) and to promote salt use less than 4 g / day during cooking	RCTs, Parallel group studies (Parallel group randomized studies), initial sample size 119, but who followed until the end of the study 92 people (Control group 49, and intervention 43)	Application of the SAL-level program theory. Interventions are given in two sessions, which takes 60-90 minutes to one group of 10 women. 1. First session (raising awareness, and how to overcome obstacles, with role playing activities). Two cardiovascular expert nurses were included in this session. They participated in two training days where they had previously been given guidance on the intervention to be carried out, details of the contents of each session and the estimated duration of each activity and the materials used 2. The second session, guided training, with direct skills development activities, with a spoon size of 4 grams of salt, and counter-conditioning activities, using natural spices that have been presented as an alternative to the use of salt. Illustration	24-hour urine excretion was measured using centrifuges and salt concentrations were measured using Atom Absorption Flame Spectrometry and psychosocial measurement scales to measure variables of intention, self-efficacy, and habits. Natural spices, illustrated pictures of natural spices, two cardiologist nurses, one skilled nurse and one nutritionist (dietitian).	After three months of follow-up, the intervention group was significantly (p value between 0.05 and 0.001) increased compared to the control group regarding the steps in adding salt as well as psychosocial variables (all p values were 0.001). Reduction of sodium excretion in 24-hour urine results are not significant	1. Respondents may not represent all hypertensive patients, given the limited number of individuals and respondents in this study devoted to women. 2. Data are based on self-reported measurements by each respondent, except objective 24-hour urinary sodium excretion

			pictures of natural spices are used to encourage participants to discuss how to use them. The women were also trained to read processed / prepared food labels to verify sodium content. A trained nurse and nutritionist was involved in this session			
(Zhou et al., 2013)	The aim of this study was to assess the long-term effects of salt replacement on blood pressure.	RCT, double blind, with 200 families in rural China	The intervention period of this study lasted for two years. All families were randomized to a computerized randomization scheme to one group of two groups. Everyone in the same family receives the same treatment (regular salt or salt substitute). Normal / normal salt group (control group) and the other is a salt replacement group. The salt substitute used is made from 65% sodium chloride, 25% potassium chloride and 10% magnesium sulfate.	1. All study treatments are produced, packaged and labeled by the Shenyang Hongmei Salt Industry Company (Shenyang City, Liaoning Province, China) in accordance with Chinese Manufacturing Standards. 2. Basic questionnaire and undergo a brief physical examination 3. Blood pressure was measured at each visit by a trained doctor using the automatic Omron HEM-770A sphygmomanometer (OMRON (China) Co., Ltd. (OCE / OCE-HCB / OCE-SH), Shanghai, China) 4. Sodium and potassium concentrations were measured in blood and urine using the ion	a. a. Of the 462 individuals in this study, 372 (81%) individuals completed the study. For normotensive subjects, the mean overall differences in systolic and diastolic blood pressure between the two groups at 24 months follow-up were 2mmHg (95%, confidence interval (CI) 0–4mmHg, P <0.05) and 2mmHg (95% CI 1–3mmHg , P <0.05), each variable. For subjects with hypertension, a significant decrease in overall systolic blood pressure showed a decrease of 4 mmHg (95%, CI 2–6 mmHg, P <0.05) between the two groups. Diastolic blood pressure is not affected by the use of salt in the hypertension group b. The comparable number of participants in the two treatment groups was reported in the current therapy for the use of antihypertensive drugs, with the most common drug being Captopril, combined Reserpine,	Because we cannot calculate precisely the amount of salt consumed, we cannot judge whether the amount of salt used affects the final effect of salt substitutes on blood pressure. More research is needed to determine a sufficient number of substitutes to reduce blood pressure, and whether the taste of the salt substitute is still acceptable to the patient.

				selective electrode method		and Nifedipine. With the exception of alcohol consumption habits and family history of hypertension, the initial characteristics did not differ between the two groups.
(Wessler et al., 2016)	To assess the appropriateness and efficacy of food provision in accordance with the Dietary approaches to stop hypertension / Sodium-restricted diet (DASH / SRD) in the elderly (elderly adults) with hypertension after discharge from the hospital in patients with acute decompensated hearth failure (ADHF). Efficacy will be assessed by improving quality of life related to health and feasibility will be assessed by compliance with the DASH / SRD program	RCT, Single-blind, 66 subjects / samples	The 12-week duration was designed to determine the safety and efficacy of foods adjusted for DASH / SRD in the elderly (late adults) after discharge from ADHF hospitalization. 66 subjects will be randomized in 1: 1 mode based on gender and left ventricular ejection fraction (<vs ≥50%). The research subjects will receive food that is adjusted to the needs of the home, who are given DASH / SRD that has been prepared in advance or advice on regular diet for 4 weeks after returning from the hospital. Researchers will be blinded to group assignments, food diaries, and urine electrolyte measurements until the study is complete. and health-related quality of life measures (The Kansas City Cardiomyopathy Questionnaire (KCCQ) - SF-12	After study enrollment, both groups will receive a standard pamphlet containing instructions after limiting sodium (salt) to 2000 mg / day, standard recommendations for repatriation at three registration centers; recommendations in this material in general are also consistent with the DASH dietary pattern. In both groups, study personnel will ask and answer questions related to dietary problems during safety visits and during telephone calls in the second and third weeks. Specific food consumption will be assessed by a 3-day food diary and sodium and potassium levels in the urine during the first and fourth weeks after returning from the hospital	The primary efficacy endpoint was a change in the summary score of the Kansas City Cardiomyopathy Questionnaire (KCCQ) for health-related quality of life from study enrollment to 4 weeks post-discharge. Safety evaluation will focus on conditions of hypotension, renal insufficiency and hyperkalemia endpoint exploration including echocardiography, non-invasive vascular tests, oxidative stress markers, and salt taste sensitivity.	The experimental design did not adjust for variations in basic habits in sodium intake. As in most hospitals in North America, all ADHF hospitalized patients at the three trial sites received a sodium restriction diet of 2000 mg / day while hospitalized. This standard intervention before randomization should minimize the impact of the diet before hospitalization. A sodium threshold of 1500 mg / day for the study diet and was chosen to match the current American Heart Association recommendations, and supported by a pilot study, in which foods with 1500 mg / day of sodium were given to older outpatients without adjustments for dietary practices. at the beginning. We recognize that the effects of home food delivery on quality of life may be challenging to separate from the effects specifically related to DASH / SRD. In addition to KCCQ, we will get the SF-12, a validated general quality of life measure, to evaluate changes in quality of life associated with food delivery from home.
(Wang et	The aim of this	RCT, 180 patients	According to the 2010	1. Blood pressure is	After 2 months, office blood pressure	This research has several

| al., 2015) | study was to compare the antihypertensive effects of three types of antihypertensive drug therapy between different levels of salt intake. | with mild to moderate primary hypertension. Respondents were randomly allocated to the low-salt diet (LSD) group (90 cases) and the non-low salt diet group (NLSD) (90 cases). Each group consists of three sub-groups and each sub-group consists of 30 respondents, as follows:
1. Losartan subgroup 100 mg; 30 respondents,
2. Losartan subgroup 50 mg / 12.5 mg HCTZ; 30 respondents, and
3. Irbesartan subgroup 150 mg / HCTZ 12.5 mg; 30 respondent | Chinese Guidelines for Hypertension Management, which the standard low salt diet in China is currently 2.3 g of sodium per day (about 6 g after conversion to the salt unit). Staff arranged for the provision of LSD health education for patients in the LSD group. By using a limited salt spoon, the salt content in the patient's diet is tightly controlled. Patients in the NLSD group gave a rough estimate of their daily salt intake. Every patient receives the right medicine every morning for two months. Blood pressure is monitored through the following methods: office blood pressure monitoring and 24-hour outpatient blood pressure monitoring (ABPM). Blood pressure is recorded before and after 2 months of treatment. Morning blood pressure is obtained by calculating the average value of each individual recorded between 06:00 and 10:00 am | measured in the upper right extremity with the patient in a sitting position at regular intervals using the same standard vertical mercury sphygmomanometer
2. Laboratory tests (fasting blood sugar, glycerin, total cholesterol, low density lipoproteins, urea, creatinine, uric acid, and potassium ions) | (BP), blood pressure averaged 24 hours, and morning blood pressure was significantly reduced (P ≤0.01) in each group. No significant differences were observed between the 3 sub-groups of the low-salt diet (P> .05). In the low-salt diet group, the losartan subgroup 50mg / HCTZ 12.5 mg, and the irbesartan subgroup 150mg / HCTZ12.5 mg showed identical antihypertensive efficacy (P> 0.05), and this group was significantly different from losartan 100 mg subgroup (P ≤.05). Blood pressure from patients who received a low-salt diet decreased more than those with a Non-Low Salt Diet (P≤0.05). Therefore, we conclude that this low-salt diet has a synergistic effect on blood pressure reduction | limitations, because the center of this research is centered on a single study so that the number of respondents is in the small scale category. Therefore, the findings of this study must be confirmed by large-scale research. In addition, whether drug administration in combination provides superior protection against cardiovascular disease compared to the use of a single agent is still unknown and requires further evaluation. |

Discussion

Some of the intervention methods used include health education, exercise or health practice, the application of self-efficacy and self-care theory, routine meetings, and the principle of self-efficacy. Attention and acceptance of self-efficacy against the use of salt less than 4g / day in preparing food and reducing the habit of adding salt more than 4 grams / day during cooking has been reported to have significantly increased (Marilia E Cornélio et al., 2016; Irwan et al. , 2016) The key variable in observing changes in one's intentions is self-efficacy (Solvang, Norekvål, Tell, Berge, & Iversen, 2014).

The instrument used in measuring blood pressure is using the Sphygmomanometer model. From the articles studied, blood pressure is one indicator or outcome, there is also a baseline (Marilia E Cornélio et al., 2016; Irwan et al., 2016; Wang et al., 2015; Wessler et al., 2016; Zhou et al., 2013). However, one study also mentions that blood pressure is not the main outcome but only as supporting data, blood pressure can be influenced by several things such as internal factors of someone suffering from high blood pressure or external factors (Irwan et al., 2016). Another indicator is the level / concentration of salt both in food and urine 24-hours for the percentage of salt in food (Compact Salt Meter) and 24-hour urine salt concentrate (KME-03 Salinity Checker and Atom Absorption Flame Spectrometry). The instruments used in measuring respondents' behavior or psychosocial such as self-efficacy using a general measurement scale), self-care using 12-item Knowledge of Hypertension Index (KHI) and health-related quality of life after discharge from hospital using SF-12 & The Kansas City Cardiomyopathy Questionnaire (KCCQ).

All articles reviewed have varied benchmarks. However, we identified there were some effects or effects caused when applying the behavior of low-salt diets that have similarities, for example salt substitutes can be adjuvant therapies that are useful for hypertensive and pre-hypertensive patients, benefit in improving ventricular function, ventricular-arterial coupling, and volume reduced plasma and a reduction in systemic oxidative stress and inflammation, as well as a shift in salt taste affinity, three antihypertensive drug regimens in the low salt diet group were significantly more effective in reducing blood pressure not only in the office but also blood pressure per 24 hours and morning blood pressure, the number of people with high blood pressure who reported that they had reduced salt intake to less than 4g per day had

increased, there was an increase in knowledge, attitudes, self-care practices, and self-efficacy regarding salt reduction in groups that had received education and training. salt reduction (Marilia E Cornélio et al., 2016; Irwan et al., 2016; Wang et al., 2015 Wessler et al., 2016; Zhou et al., 2013). A study conducted by Zhou et al., (2013) reported that the use of salt with sodium, potassium and magnesium content effective against blood pressure reduction, the study report was supported by previous studies (Frank M. Sacks et al., 2001; He & MacGregor, 2002, 2009). Real improvement in quality of life occurs during hospitalization but smaller results are recorded after returning from hospital (Wessler et al., 2016).

Previous studies say that low-salt dietary behavior has a positive effect, and can increase awareness of factors that influence adherence to low-salt diets (Bolin et al., 2018). Other studies have reported that adherence to a low-salt diet directly reduces systolic blood pressure in patients with high blood pressure (He & MacGregor, 2009; O'Donnell et al., 2014; Pimenta, et al., 2009). In hypertensive patients who undergo treatment at the hospital have good blood pressure control status; however, it is still low in achieving salt intake estimates <6 g / day (Ohta, Kimura, Kitaoka, Sakata, & Abe, 2017). Self-care agent variables on salt reduction, the most powerful variable agent in promoting the restriction of salt intake in older adults (elderly) with hypertension, were then followed by knowledge variables regarding salt reduction, self-care behavior, and living environment. In certain groups such as the elderly need additional knowledge about reducing salt intake because it is very helpful for the elderly in understanding blood pressure responses, sources of salt (sodium) contained in daily food and aware of how to care for themselves and strategies to avoid salt intake high (Srikan et al., 2017).

Conclusion

Application of low-salt dietary behaviors in patients with high blood pressure can increase self-efficacy, self-care, attention or focus, awareness of salt use of less than 4 grams per day (as for literature using less than 6g of salt per day), intention or will to change habits / behavior add salt more than 4 grams of salt per day when preparing or cooking food, as well as improving the quality of life after being discharged from the hospital. Subsequent studies are expected to look more broadly at the intensity of meetings related to education and training of salt reduction, status of self-efficacy, behavior or habits in the use of salt every day, and more emphasis on who prepares or processes food ingredients, and

identifies the supporting and inhibiting factors in application. low-salt diet.

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