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The Health Beliefs Scale for Hypertensive patients: Construction and Psychometric Testing

Rithuma Oruganti[1], Swathi Paidipati[2], Manjunath Dinaker[3]
[1](Psychology Department, Osmania University, India)
[2](Psychology Department, Osmania University, India)
[3](Internal Medicine, GYD Diagnostics, India)
Corresponding Author: RithumaOruganti

Abstract:
Background: *The Health Belief Model is a theoretical framework that has been used to explain and predict compliance behaviors. The objective was to develop and validate a self-report Health Beliefs Scale for Hypertensive Patients (HBSHP), which measured the health beliefs of hypertensive patients,in accordance with the tenets of the Health Belief Model (HBM).*
Method: *The study involved five phases of item construction, content validation, field testing, factor analysis and the establishment of the reliability and validity of HBSHP. The scale was tested on 200 hypertensive adults in the age range of 22-70 years and the development and initial testing of the psychometric properties of the scale was carried out.*
Results: *The principal components analysis method identified five factors viz. perceived susceptibility, perceived severity, perceived benefits, perceived barriers and perceived self-efficacy, which were in accordance with hypothesized theoretical groupings. The reliability and validity analyses were found to be satisfactory.*
Conclusion: *There have been few standardized scales to measure the components of the Health Belief Model. Hence the HBSHP can serve to quantify health beliefs, according to the tenets of the HBM providing a holistic approach, to the effective management of hypertension.*
Keywords: *health beliefs, treatment adherence, positive health behaviors, hypertension control, health promotion interventions*

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I. Introduction

Hypertension is a chronic non-communicable disease condition,with rapidly increasing prevalence and incidence rates worldwide. According to the World Health Organization data, the prevalence of hypertension in the developed countries, is around 35% and in the developing countries is 40% (World Health Organization, 2018). In India, the prevalence of hypertension in urban areas has been found to range from 25% to 30% while in rural areas the prevalence has been found to range from 10% to 20% (Gupta & Gupta, 2017). The prevalence of hypertension across the world has been estimated to increase by 60% by the year 2025 (World Health Organization, 2003). The hypertension related incidence rates in India have been found to be approximately 36% among urban adults and 30% among rural adults (Ram, 2017). A majority of hypertensive patients, across the globe and in India have been found to be unaware, of their hypertensive status. The situation is dismal in light of the fact that the health complications of uncontrolled and untreated hypertension, cause 1.1 million deaths annually in India (Ram, 2017), with 57% of all stroke deaths and 24% of all coronary heart disease (CHD) deaths, being attributed to poor hypertension control (Anchala et al., 2014; Gupta and Gupta, 2017).

Lack of education, poor socio-economic status and residence in rural areas, were found to be associated with poor compliance to hypertension treatment, and sub-optimal BP control in India (Gupta & Gupta, 2017). This spells danger as hypertension is an asymptomatic condition known as the "silent killer", and the health complications of neglecting hypertension, include cardiovascular diseases, renal failure, stroke, paralysis, brain hemorrhage, blindness and multi-organ damage.

Previous research has shown that low health literacy, incorrect health beliefs rooted in cultural practices, low levels of education and inadequate knowledge about one's disease condition were found to be correlated with decreased treatment regimen compliance and increased mortality among hypertensive patients (Witten, Vuuren, &Learmonth, 2013; Giuse, Koonce, Storrow, Kusnoor, & Ye, 2012; Desmedt&Valcke, 2004).

The health beliefs of hypertensive patients regarding their condition, have been found to determine lifestyle and medication regime adherence, thus significantly influencing the management and control of the condition, and impacting quality of life outcomes (Oruganti, Paidipati, &Dinaker, 2018; Mpinda, Tumbo,

Govender, & Mills, 2014). The Health Belief Model (HBM) is a theoretical framework that has been used to explain and predict a wide range of health behaviors. The constructs of HBM,have been used to predict compliance to the medication and lifestyle regime, with regard to various diseases. According to the Health Belief Model, an individual's decision to undertake a specific health behavior, is a function of his or her beliefs on six subjective dimensions – perceived susceptibility to the health threats posed by a disease condition, perceived severity of the disease condition, perceived benefits of undertaking the health action, perceived barriers to engaging in the positive health behavior, cues to action which involve strategies to activate "readiness" to engage in the positive health behavior through reminders, promoting awareness etc. and perceived self-efficacy which is the confidence in one's ability to perform the recommended health action.

Health beliefs regarding dietary choices and lifestyle behaviors, have been found to be rooted in cultural and social traditions, practices and values, strongly influencing the management and control of hypertension in a community (Witten, Vuuren, &Learmonth, 2013; Kruger, Puoane, Senekal, & Van Der Merwe, 2005).

Incorrect health beliefs such as anti-hypertensive medication being unnecessary, adverse side-effects of medication, stoppage of medication once BP is controlled, low perceived susceptibility to the health related complications of uncontrolled BP and low perceived severity of the condition of hypertension were found to be associated with low medication adherence leading to poor health outcomes among hypertensive patients (Oruganti, Paidipati, &Dinaker, 2018; Mpinda, Tumbo, Govender, & Mills, 2014; Horne, Clatworthy, Polmear,&Weinman, 2001).

The available scientific literature has shown that poor compliance and patients decisions to stop the conventional treatment for hypertension and use alternative and traditional remedies were found to stem from incorrect health beliefs and poor knowledge regarding their condition leading to adverse health outcomes in a community (Witten, Vuuren, &Learmonth, 2013; Mpinda, Tumbo, Govender, & Mills, 2014). People's perceptions of their illness such as beliefs about the causes, duration, and consequences of their disease condition were found to determine their health outcome (Petrie, Weinman, Sharpe, & Buckley,1996).

According to the self-regulatory model, patients decide whether or not to comply with the treatment, by assessing whether or not it is in tune with their health beliefs of the condition and once started on medication, continue with it only after evaluating the relative success, of the treatment in alleviating their disease condition (Mpinda, Tumbo, Govender, & Mills, 2014; Conner & Norman, 1996).

The problem of the escalating burden of hypertension, assumes specific significance for the state of Telangana with hypertension prevalence rates, being 30 to 35% and less than 10% of those with hypertension being aware of their hypertensive status (Ram, 2017). The situation is dismal as hypertension has been found to account for over 1.6 million deaths in India, with 53.8% of heart disease deaths, 55.7% of stroke deaths and 54.3% of deaths due to chronic kidney disease, being attributed to this chronic non-communicable disease condition (Yadavar, 2018). There has been a paucity of standardized scales to measure the components of the Health Belief Model. Hence a holistic health belief assessment scale, to measure the health beliefs of hypertensive patients in accordance with the tenets of the Health Belief Model (HBM), was considered relevant in order to predict adherence to the medication and lifestyle regime among patients.

The aim of the present study was to develop and perform the preliminary psychometric evaluation, of a health beliefs assessment scale for hypertensive patients, which would have a clinical and research application value for primary care patients. The study was conducted in 5 stages namely, Item construction, Content validation, Field testing of the scale, Factor analysis, Reliability and Validity analyses.

II. Method

Participants

The study was conducted in an outpatient primary care facility called "GYD Diagnostics and Reference Laboratories Pvt. Ltd" and in a community-based setting, wherein a total of 200 hypertensive patients, were recruited using the purposive sampling method. Of the 200 hypertensive participants, 100 were recruited from the clinic setting, and 100 were recruited from the community based setting. Written permission was obtained from the management of the primary care facility and informed consent was sought from all the study participants.The inclusion criteria indicated that the participants must be in the age range of 22-70 years and must have a diagnosis of primary hypertension. The exclusion criteria were the presence of secondary hypertension, co-morbid conditions such as diabetes mellitus and the presence of a prior psychological illness. Among the total study sample, 57% were women and 43% were men. They were aged between 33 and 68 years (M = 56.78). Of the total study sample, 34% were under-graduates, 28% had completed their high school education, 24% were post-graduates, 7.1% were not educated, 6.3% had completed professional courses, .8% were diploma holders and .8% had completed their PhD. Among the study participants, 62.2% had a family history of hypertension while 37.8% did not have a family history of hypertension.

Instruments

HBSHP was administered along with the Health Belief Scale by Weissfeld, Kirscht and Brock (1990), the Learned Helplessness Scale (LHS) by Quinless and Nelson (1988) and the Chronic Disease Self-Efficacy scale by Lorig, Stewart, Ritter, Gonzalez, Laurent and Lynch (1996).

***Health Belief Scale (Weissfeld, Kirscht, & Brock, 1990*).** This scale was developed by Weissfeld, Kirscht and Brock (1990). The scale measured the perceived susceptibility to the health complications of hypertension, the perceived severity of the condition of hypertension and the perceived benefits of engaging in positive health behaviors among hypertensive patients. A Likert response scale with 4 to 6 levels was used for recording the responses. Higher scores indicated attitudes in favor of the specific component being measured and overall high scale scores indicated positive health attitudes and health behaviors in accordance with the tenets of the Health Belief Model. The internal consistency of the perceived susceptibility, perceived severity and perceived benefits sub-scales were found to be .77, .89 and .84 respectively. In the current sample (N = 200), the internal consistency of the perceived susceptibility, perceived severity and perceived benefits sub-scales were found to be .52, .54 and .69 respectively.

***The Learned Helplessness Scale* (*Quinless& Nelson, 1988*):** This scale has 20 items measured on a four point Likert response scale. The scale assessed a person's confidence in their ability to successfully execute tasks and solve problems to reach desirable outcomes. The internal consistency of the scale was found to be .85. The total score of the 20 items indicated the level of learned helplessness. The total scores on the LHS can range from 20 to 80, with higher scores indicating an increased perception of learned helplessness. In the current sample (N = 200), the internal consistency of the scale, was found to be .86.

***Chronic Disease Self-Efficacy Scale* (*Lorig, Stewart, Ritter, Gonzalez, Laurent, & Lynch, 1996*):** This 33 item scale measured the confidence of chronic disease patients, in their ability to manage their disease condition effectively, by engaging in positive health behaviors. The items of the scale were measured on a 10 point Likert scale ranging from 1= least confidence in engaging in a particular activity to 10 = very confident of engaging in a particular activity. For e.g. "How confident are you that you can do aerobic exercise such as walking, swimming or bicycling three to four times each week?". The domains measured by this scale are common across various chronic diseases and include regular exercise, information about the disease, help from community, family and friends, communication with the physician, disease management, doing chores, social/recreational activities, symptom management, management of shortness of breath and depression management. The internal consistencies of the sub-scales were found to range from .77 to .92. Higher scores on the sub-scales indicated higher self-efficacy, in engaging in various health enhancing behaviors.In the current sample (N = 200), the internal consistencies of the regular exercise, information about the disease, help from community, family and friends, communication with the physician, disease management, doing chores, social/recreational activities, symptom management, and depression management sub-scales were found to be .79, .73, .77, .70, .83, .75, .85, .87, and .90 respectively.

Procedure

The study was granted approval by the Institutional Ethics Committee of Osmania University.Written informed consent was sought from hypertensive patients who were willing to participate in the study. The administration of the four scales took approximately 30 to 50 minutes to complete. For non-literate respondents, the items in the scale were read out one after the other, and filled in by the investigator.

Item Construction:This scale was constructed by taking into consideration the components of Health Belief Model (HBM) viz. perceived susceptibility, perceived severity, perceived benefits, perceived barriers and perceived self-efficacy. The initial item pool came from three sources: (1) review of the scientific literature pertaining to health beliefs (2) review of existing health beliefs scales shown to be reliable and valid and (3) structured interviews with hypertensive patients and doctors regarding the various dimensions of health beliefs. In these interviews hypertensive patients were asked to describe their attitudes towards medicines, lifestyle changes and medical care as well as their perceived susceptibility and severity to the health complications of hypertension. From these sources, we derived 81 items to measure health beliefs, in the 5 dimensions of the HBM for the scale.

Content validation:For determining the content validity of the items, this initial item pool was submitted to a panel of 10 experts in order to determine the essentiality of the items,to the measurement of health beliefs with respect to primary hypertension.The panel of judges was asked to rate each item, as essential or not essential for the measurement of health beliefs, with respect to primary hypertension. Lawshe's content validity ratio was used to determine the essentiality of items, to the measurement of health beliefs about hypertension, by assessing the inter-rater agreement among the panel of experts.The items whose critical values, exceeded Lawshe's critical value criterion of 0.62 (in the case of 10 judges), were included in the final scale.The final scale comprised of 34 items related to health beliefs about hypertension. In each hypothesized dimension,

the number of items were: perceived susceptibility, 4 items; perceived severity, 3 items; perceived benefits, 9 items; perceived barriers, 10 items; and perceived self-efficacy, 8 items.

Description of HBSHP:The newly developed scale, comprisedof 34 items which were measured on a 6-point Likert response scale, ranging from strongly disagree to strongly agree. The items were structured in the form of complete statements, about beliefs regarding health behaviors, for effective hypertension control and management (e.g. Regular exercise prescribed by my doctor is very important to keep my BP under control). The items from the different content areas were randomly distributed throughout the scale.The instructions required the participant to indicate his or her level of agreement or disagreement, with the statement and clearly indicated that there were no right or wrong answers, and the participant should feel free to respond according to what was true in their individual case. The scale was translated and back-translated into the local languages of Telugu and Hindi. The scoring of the negatively worded items was reversed prior to the factor based scale computation, so that a high score on each of the dimensions of the newly developed health belief scale, represented a strongly held belief about the underlying factor being measured.

***Factor Analysis and Reliability*:**In order to determine the factors, underlying the health beliefs of hypertensive patients, we performed exploratory factor analyses. Internal consistency of the items, contributing to each factor-based scale, was estimated using Cronbach's alpha.

Validity

***Assessment of Construct Validity*:**In this phase we aimed to establish construct validity, to determine whether the results of the principal components analysiswere in accordance with the hypothesized theoretical groupings, decided apriori based on the components of the Health Belief Model. The objective was to provide empirical evidence, for the validity of the theoretical constructs by determining whether the factor based scales, were in accordance with the hypothesized components of the Health Belief Model.

Assessment of Criterion Validity:In this phase, we aimed to establish the criterion validity by correlating scores on the newly developed scale, with an existing health belief scale developed by Weissfeld, Kirschtand Brock (1990). The Health Belief Scale (Weissfeld, Kirscht, & Brock, 1990), that was used to establish the concurrent validity of the HBSHP, was a multi-dimensional scale that measured the perceived susceptibility to the health related complications of hypertension, perceived severity of the condition of hypertension, and the perceived benefits of engaging in health enhancing behaviors for hypertensive patients. For the perceived barriers component of the newly developed HBSHP, we did not find a similar scale in scientific literature that measured perceived barriers, to the medication and lifestyle regime. Hence we identified the construct of learned helplessness, which our literature review showed to share a positive relationship, with the perceived barriers to the uptake of health services and positive health behaviors. To establish the concurrent validity of the perceived barriers component of HBSHP, we administered the Learned Helplessness Scale (LHS), by Quinless and Nelson (1988). To establish the concurrent validity of the self-efficacy component of our newly developed scale, we administered the Chronic Disease Self-Efficacy scale by Lorig, Stewart, Ritter, Gonzalez, Laurent and Lynch (1996), to determine whether positive relationships existed between the scores on the two scales.

III. Results

Exploratory Factor Analysis

To establish the construct validity of the scale and identify factors, exploratory factor analysis (EFA) was performed, by applying the principal components analysis extraction method with varimax rotation. The assumptions for executing EFA were met by the data. Specifically, the Bartlett's Test of Sphericity was significant ($p < .001$), and the Kaiser-Meyer-Olkin measure of sampling adequacy (.78) was satisfactory. The covariance values for all the items were above .50 and the communality values for all the items were above .30.

Table 1: *Communalities for the 34-item HBSHP*

Item no.	Initial	Extraction
1	1	.67
2	1	.59
3	1	.73
4	1	.64
5	1	.68
6	1	.59
7	1	.63
8	1	.59
9	1	.77
10	1	.62
11	1	.77
12	1	.69

13	1	.64
14	1	.69
15	1	.74
16	1	.69
17	1	.66
18	1	.64
19	1	.70
20	1	.67
21	1	.55
22	1	.53
23	1	.72
24	1	.74
25	1	.73
26	1	.73
27	1	.70
28	1	.69
29	1	.66
30	1	.64
31	1	.73
32	1	.64
33	1	.63
34	1	.70

Principal components analysis identified five factors with Kaisers eigenvalues greater than 1 (Table 2). These five factors accounted for a total of 72% of the variance in the data. For factor loadings, we used the criterion of greater than .30. The results of the principal components analysis were compared with our apriori theoretical grouping of items. It was found that the factor based scales, were in accordance with the hypothesized theoretical groupings, providing confirmatory evidence for the construct validity of the scale. In order to label the factors, items within each were examined. Factor 1 explained 21% of the variance and was labeled "Perceived Susceptibility". The four items in this dimension,explored the beliefs of respondents regarding their perceived susceptibility, to the health related complications of hypertension such as heart attack, stroke, renal failure, and emergency hospitalization (e.g., If I don't manage my hypertension, I may have a heart attack). Factor 2 accounted for 18% of the variance and was labeled "Perceived Severity". The three items in this dimension, were related to beliefs about the perceived severity of hypertension, the importance of taking regular medication and the impact that high BP has on one's life (e.g., Having high BP is a serious condition). Factor 3 contributed to 14% of the variance and was called "Perceived Benefits". The nine items loading significantly on this factor explored beliefs, regarding the benefits of engaging in positive health behaviors, such as diet control, stress management, exercise, regular BP monitoring, regular medication, avoiding alcohol and smoking in the effective management and control of hypertension (e.g., Regular practice of relaxation exercises such as yoga asanas/meditation helps me in keeping my BP under control). Factor 4 explained 10% of the variance and was labeled "Perceived Barriers". The ten items in this dimension, were related to the perceived barriers in adherence to medication and lifestyle recommendations, such as forgetting to take BP medication, travel and busy schedules being an impediment to adherence behaviors, cooking separately acting as a deterrent to suitable dietary choices, and the need for reminders from other family members in order to stick to the prescribed medication and lifestyle regime (e.g. I forget to take the BP medicine mainly because of busy schedule). Factor 5 accounted for 9% of the variance and was called "Perceived Self-Efficacy". The eight items constituting this dimension, were related to the confidenceof hypertensive patients in their ability to engage in positive health behaviors, for effective BP management such as being regular with medication, following a prescribed dietary regime, keeping one's BP regulated and controlled, managing stress and avoiding bad habits such as smoking and alcohol intake (e.g. If only I try, I can keep my BP under control).

Table 2:*Factor loadings, eigenvalues, percentage of variance explained, number of items, coefficient alpha, and mean inter-item coefficient for the 34-item HBSHP*

Original item's no	Factor loadings				
1 2	3	4	5		
Item 1	.797				
Item 14	.776				
Item 10	.763				
Item 26	.746				
Item 11		.824			
Item 15		.793			
Item 2		.704			
Item 3			.875		
Item 27			.824		
Item 16			.792		

Item 12			.784		
Item 33			.764		
Item 4			.745		
Item 17			.726		
Item 13			.704		
Item 6			.675		
Item 24				.846	
Item 34				.821	
Item 28				.793	
Item 20				.789	
Item 30				.756	
Item 18				.748	
Item 29				.732	
Item 7				.721	
Item 8				.698	
Item 22				.695	
Item 9					.875
Item 25					.862
Item 23					.854
Item 31					.849
Item 19					.827
Item 32					.764
Item 21					.672
Reliability Estimates	1	2	3	4	5
Eigenvalue	7.19	6.01	5.11	4.40	4.01
% of variance explained	21%	18%	14%	10%	9%
No. of items	4	3	9	10	8
Coefficient alpha	.52	.54	.69	.60	.63
Mean inter-item correlation	.60	.57	.70	.48	.52

The reliability of the scale in the form of internal consistency was high with Cronbach's α = .79 for this sample. The internal consistency values for Factors 1, 2, 3, 4, and 5 were .52, .54, .69, .60 and .63 respectively. All the items had loaded above .30 in their specific factors, indicating the presence of convergent validity. In order to determine the discriminant validity of the scale, factor scores were computed using the factor based scale approach,following which inter-correlations were calculated (Table 3). It was found that the factors did not have high correlations (>.70) with the other factors (r ranged between .01 to .39). Hence, HBSHP demonstrated discriminant validity.

Table 3: *Correlations between factors by taking factor-based scale scores*

	1	2	3	4	5
1. Perceived Susceptibility	1	.30**	.20	.17	.31**
2. Perceived Severity		1	.20**	.03	.15
3. Perceived Benefits			1	.01	.29
4. Perceived Barriers				1	.39
5. Perceived Self-Efficacy					1
M	4.33	3.22	2.15	1.67	4.66
(SD)	(1.15)	(1.52)	(1.05)	(0.91)	0.98

Note. **p < .01

We sought to examine the differences across the five factors of HBSHP, by using the one-way repeated measures ANOVA. The results of the one-way repeated measures ANOVA, indicated a significant difference across the 5 factor-based scale scores, Wilks'Lambda = .46, $F(4, 196) = 36$, $p < .001$, $\eta^2 = .53$. Pair-wise comparisons showed that the five factor based scales were significantly different from each other, $p < .001$. Post-hoc comparisons (Bonferroni) revealed that Factor 1 or "Perceived Susceptibility" (M = 4.33, SD = 1.15) differed significantly (p < .001) from Factor 2 or "Perceived Severity" (M = 3.22, SD = 1.52), Factor 3 or "Perceived Benefits" (M = 2.15, SD = 1.05) and Factor 4 or "Perceived Barriers" (M = 1.67, SD = 0.91). Factors 2, 3 and 4 differed significantly (p < .001) from all the remaining factors. Factor 5 or "Perceived Self-Efficacy" (M = 4.66, SD = 0.98) differed significantly (p< .001) from all the other factors except Factor 1.

HBSHP: Establishment of Criterion Validity

In this phase, we aimed to establish the criterion validity of HBSHP, wherein we correlated the factor based scale scores on the HBSHP with existing scales. We investigated the concurrent validity of the HBSHP, by administering it along with an existing Health Belief Scale(Weissfeld, Kirscht, & Brock, 1990), the Learned

Helplessness Scale (Quinless& Nelson, 1988) and the Chronic Disease Self-Efficacy Scale (Lorig, Stewart, Ritter, Gonzalez, Laurent, & Lynch, 1996).

The constructs of "Perceived Susceptibility", "Perceived Severity", and "Perceived Benefits", were correlated with the identical constructs measured by the existing Health Belief Scale, to examine whether positive relationships existed between the scores of the two scales.The three factor based scale scores of perceived susceptibility, perceived severity and perceived benefits, were found to be positively correlated with the identical constructs, measured by the existing Health Beliefs Scale (Table 4). It was found that there was a significant positive association, between the perceived susceptibility scores of the HBSHP and the existing health belief scale, ($r(198) = .52$, $p < .01$). There was a significant positive relationship between the perceived severity scale scores of the HBSHP and the existing health belief scale, ($r(198) = .62=0$, $p < .01$). Similarly, there was a significant positive association between the perceived benefits scores of the HBSHP and the existing health belief scale ($r(198) = .60$, $p < .01$). Significant positive associations were found between the perceived susceptibility dimension of HBSHP and the perceived benefits dimension of the existing health belief scale ($r(198) = .33$, $p < .01$), the perceived severity dimension of HBSHP and the perceived benefits dimension of the existing health belief scale ($r(198) = .22$, $p < .05$), the perceived benefits dimension of HBSHP and the perceived susceptibility dimension of the existing health belief scale ($r(198) = .49$, $p < .01$) and the perceived benefits dimension of HBSHP and the perceived severity dimension of the existing health belief scale ($r(198) = .45$, $p < .01$). Since the three factor based scales of HBSHP, showed significant positive relationships with the identical constructs of the existing health belief scale, the presence of concurrent validity was inferred.

Table 4: *Product moment correlations between HBSHP scores and Health Belief Scale scores*

HBSHP	Health Belief Scale			
	M (SD)	Perceived Susceptibility	Perceived Severity	Perceived Benefits
Perceived Susceptibility	4.33 (1.15)	.52**	.34	.33**
Perceived Severity	3.22 (1.52)	.25	.62**	.22*
Perceived Benefits	2.15 (1.05)	.49**	.45**	.60**
M (SD)		0.71 (0.61)	1.43 (0.88)	3.03 (0.51)

Note. *p < .05, **p < .01

The construct of "Perceived Barriers", was correlated with the Learned Helplessness Scale (Quinless& Nelson, 1988), to verify whether positive relationships existed between them (Table 5). Similarly the "Perceived Self-Efficacy" construct, was correlated with the Chronic Disease Self-Efficacy Scale (Lorig, Stewart, Ritter, Gonzalez, Laurent, & Lynch, 1996), to investigate whether positive relationships existed between the scores on the two scales (Table 5).

It was found that there was a significant positive association, between the perceived barriers dimension of the HBSHP, and the learned helplessness scale, ($r(198) = .55$, $p < .01$). There was a significant positive relationship, between the perceived self-efficacy dimension of the HBSHP, and the chronic disease self-efficacy scale, ($r(198) = .63$, $p < .01$). Thus the criterion validity of our health beliefs scale for hypertensive patients can be inferred.

Table 5**:** *Product moment correlations between the Perceived Barriers dimension of HBSHP and the Learned Helplessness Scale scores and the Perceived Self-Efficacy dimension of HBSHP with the Chronic Disease Self-Efficacy Scale Scores*

		Learned Helplessness Scale	Chronic Disease Self-Efficacy Scale
HBSHP	M (SD)	Learned Helplessness	Self-Efficacy
Perceived Barriers	2.38 (0.91)	.55**	
Perceived Self-Efficacy	3.42 (0.98)		.63**
M (SD)		1.14 (0.54)	7.56 (1.62)

IV. Discussion

The health beliefs of hypertensive patients have been known to influence medication and lifestyle adherence, prognosis, satisfaction, quality of life outcomes, management and control of their condition. In light of the poor awareness, treatment and control rates of hypertension, it was considered imperative to devise a self-report scale, measuring the health beliefs of hypertensive patients. Preliminary psychometric investigations of the newly developed scale, with a 5-factor structure, revealed satisfactory reliability and validity estimates. The principal components analysis using the varimax method identified five factorsviz. Perceived Susceptibility, Perceived Severity, Perceived Benefits, Perceived Barriers and Perceived Self-Efficacy, which were in accordance with hypothesized theoretical groupings. The scores of hypertensive patients on these dimensions,

can explain and predict their adherence to medication and lifestyle recommendations, and their motivation to engage in positive health behaviors, and effective management of their condition. This information is critical in light of the fact that poor adherence,treatment and control rates,have been found to stem from patients' incorrect health beliefs, that anti-hypertensive medication is unnecessary, there is no reason to permanently remain on the treatment regime, medication can be stopped once optimal BP control is achieved, missing medication will not have any adverse consequences, there are adverse side-effects of medication and lack of personal control over stressful life events (Mpinda, Tumbo, Govender, & Mills, 2014; Horne, Clatworthy,Polmear,&Weinman, 2001; Oruganti, Paidipati, &Dinaker, 2018).

Items in the "Perceived Susceptibility" dimension of the scale,explored the perceived susceptibility of hypertensive patients to the health related complications of hypertension, such as heart attack, stroke, renal failure and multi-organ damage. Items in the "Perceived Severity" dimension, were related to the perceived severity of hypertension as a disease condition, the impact of the condition on the life of a patient and the importance of being regular with anti-hypertensive medication.Inadequate knowledge about the severity of the condition of hypertension, and the significance of diet control were found to act as barriers to effective hypertension management (Witten, Vuuren, &Learmonth, 2013; Bourne, Lambert, &Steyn, 2002; Steyn, 2006; Steyn, Jooste, Fourie, Parry, &Rossouw, 1986). Items in the "Perceived Benefits" dimension, dealt with the importance of diet control, stress management, exercise, regular BP monitoring and medication adherence in effective hypertension management. Low scores on these dimensions, indicate the need for health care professionals to counsel, educate and correct the maladaptive health beliefs of hypertensive patients. Scientific evidence has shown that the perceived facilitators and barriers, to hypertension treatment were found to influence patients' decisions, to manage their hypertension (Rimando, 2015). In accordance with the constructs of the Health Belief Model, higher compliance to the treatment regime was found among patients,with a higher perceived susceptibility to the adverse health complications of hypertension, a higher perceived severity of their condition, and enhanced perceived benefits of medication adherence (Kamran, Ahari, Biria, Malpour, &Heydari, 2014; Oruganti, Paidipati, &Dinaker,2018). Adequate knowledge about hypertension, the use of reminders, good doctor-patient communication, the use of a patient-centered approach by health care professionals and having good social support were found to be facilitating factors to improved medication adherence and hypertension control (Ogedegbe, Harrison, Robbins, Mancuso, &Allegrante, 2004).

Administering the scale during every consultation, can help dismantle the gross misconceptions and incorrect health beliefs of hypertensive patients, resulting in improved treatment and lifestyle adherence, better prognosis and enhanced quality of life outcomes. Items in the "Perceived Barriers" dimension were related to the inhibiting factors, in adherence and self-care behaviors, such as the inability to stick to the medication regime due to busy schedule, travel and attending to guests at home, cooking separately for oneself constituting a barrier to following the prescribed dietary regime, and the difficulty in getting accustomed to a healthier diet plan.

Certain maladaptive health beliefs of hypertensive patients, that there was no good reason to permanently remain on their anti-hypertensive treatment regime and the decision to continue the medication, only after evaluating the relative success of the treatment in alleviating their disease condition, constituted major barriers to treatment compliance and positive health outcomes among patients (Mpinda, Tumbo, Govender, & Mills, 2014).Psychosocial risk factors such as low levels of education, low socio-economic status, high poverty rates, poor living conditions, stressful environment and elevated levels of depression, anxiety and stress have been recognized as significant barriers to treatment adherence, positive lifestyle changes and enhanced quality of health and well-being among hypertensive patients (Fongwa et al., 2008; Witten, Vuuren, &Learmonth, 2013).

The most common barriers to medication adherence among hypertensive patients, were found to be forgetting to take the medication, side-effects of medication, poor knowledge, carelessness, and the asymptomatic nature of the condition(Doshi, Zuckerman, Picot, Wright, & Hill, 2003).Scientific evidence has shown that theforms of psychological distress such as stress, depression and anxiety, have been found to act as barriers to positive lifestyle changes (such as smoking cessation and alcohol avoidance) and medication adherence, leading to poor hypertension management (Khatib et al., 2014).

Hence health care professionals need to recognize these symptoms of psychological distress, and recommend hypertensive patients for psychological and psychiatric evaluation and treatment, to improve treatment and lifestyle adherence, thereby facilitating the effective control of the condition.There is a dire need for health care providers, to evaluate the potential facilitators and barriers to adherence behaviors, in order to equip patients with the knowledge and strategies required to overcome their perceived barriers, thereby enhancing their self-efficacy and treatment compliance.

The items in the "Perceived Self-Efficacy" dimension,explored the confidence of hypertensive patients in their ability to effectively manage their condition, by medication and lifestyle recommendations adherence.Higher perceived ability to deal with health professionals, and positive health beliefs of patients, with

regard to their self-efficacy in complying with the treatment regime, were found to be associated with enhanced medication adherence among hypertensive patients (Miszczak, Maris, Fitzgibbon, & Ritchie, 2004; Kressin et al., 2007).

The reliability of the whole 34-item scale was found to be high with a Cronbach's alpha value of .79. The factor-based scales also demonstrated satisfactory internal consistency. The convergent and discriminant validity of the scale, was also established through the results of the exploratory factor analysis, and correlations between the dimension-wise scale scores. The criterion-related validity of the HBSHP was established, through significant positive correlations with concurrently administered standardized scales, which measured the same constructs.

It was considered pertinent and relevant to develop a holistic measure of health beliefs, in order to improve hypertension-related knowledge, attitudes and practice of self-care behaviors among hypertensive patients.The adequate assessment of the physical and psychological functioning of patients, will enable health care providers to design culturally sensitive interventions with a patient-centered approach, to help hypertensive patients overcome their perceived barriers, thus fostering medication adherence and hypertension control (Krousal, Hyre, Muntner, &Morisky, 2005; Fongwa et al., 2008).

Scientific literature has shown that there has been a dearth, in the development of standardized measurement scales, to measure the components of the Health Belief Model. Hence it was considered pertinent and relevant, to quantify health beliefs according to the tenets of the Health Belief Model, to enable health care professionals to provide a holistic treatment plan for hypertensive patients.

V. Conclusion and Implications

The newly developed health beliefsscale was found to be a reliable and valid self-report tool in the measurement of health beliefs, according to the dimensions of the Health Belief Model among hypertensive patients. The scale has applied value in clinical and research settings to quantify health beliefs so as to enable health care professionals, to tailor health promotion interventions according to the individual needs of patients, thus facilitating a holistic health care approach. Health care professionals can administer the scale, to identify and explore the motivators and deterrents to adherence, and health seeking behaviors among hypertensive patients. Low scores on the perceived susceptibility, perceived severity,perceived benefits, and the perceived self-efficacy dimensions and high scores on the perceived barriers dimension of the scale, can alert health care providers to refer the patients for counseling and health education programs. The impact of health promotion interventions, for the effective management of hypertension, can be assessed through the scores on the HBSHP. Scores on the HBSHP, will help health care providers to relate effective hypertension management and adherence behaviors, with the health beliefs of hypertensive patients.Thus a holistic approach to health care, assumes significance for mitigating the life-threatening consequences, of a chronic non-communicable disease condition like hypertension.

The study had certain limitations. The participants were recruited through the method of purposive sampling. Hence generalization of results might be a problem. A more diversified sample from different geographical locations across India can be used in future studies to enhance generalizability of results.Also follow-up studies can employ confirmatory factor analysis with a larger sample size in order to test the model-fit.

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