



Original Article

Enhancing adherence and management in patients with hypertension: Impact of form and frequency of knowledge intervention



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ABSTRACT

Background: The alarming rise in prevalence of hypertension warrants psychosocial methods supplementing pharmacotherapy for better management and prevention of cardiac emergencies. The objective of the study was to assess the differential impact of the form and frequency of knowledge intervention on management of primary hypertension.

Materials and method: The study was conducted on 256 hypertensive patients recruited through purposive sampling at health centers in Hyderabad, India. Pretest post-test control group quasi-experimental design was adopted for the study. There were two forms of the knowledge intervention, namely 'Direct Interaction' and 'Audio-Visual'. Each form was presented in two frequencies namely 'single exposure' and 'double exposure'. The four groups were labelled as Direct Intervention Single (DIS), Direct Intervention Double (DID), Audio-Visual Single (AVS) and Audio-Visual Double (AVD). Adherence and management of hypertension were assessed at baseline and six weeks post experiment. Analysis of Covariance (ANCOVA) was applied using IBM SPSS Statistics version 20.

Results: ANCOVA followed by Bonferroni Multiple Group Comparison Test revealed significant differences between the four intervention groups and control group on adherence ($p < .001$). In case of hypertension management significant differences were observed between Control group and DIS, DID ($p < .001$), Control and AVS ($p < .01$). Control group did not differ from AVD.

Conclusion: There was a positive impact of Knowledge Intervention on adherence and management of hypertension. Double exposure in audio visual form was counterproductive in hypertension management.

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1. Introduction

Recent years have witnessed a humongous escalation in the prevalence of hypertension. One in three adults is affected by the

condition globally.¹ Uncontrolled hypertension has been found to result in 24% of acute myocardial infarction, 21% peripheral vascular diseases and 16% ischemic heart diseases.² Effective management of hypertension demands a shift in lifestyle. Research evidence suggests that hypertensive patients have inadequate knowledge about the condition in regard to blood pressure readings,³ nature of hypertension, importance of regular medication,⁴ seriousness of uncontrolled hypertension,⁵ and the importance of management.⁶ Educating patients on lifestyle management can be effectively carried out by Health Psychologists with the assistance of nursing professionals as major lifestyle changes depend upon health behavior modification.

Abbreviations: DI, Direct Interactions; DID, Direct Interaction Double; DIS, Direct Interaction Single; AVD, Audio Visual Double; AVS, Audio Visual Single; HKT, Hypertension Knowledge Test; HyCompS, Hypertension Compliance Scale; MAP, Mean Arterial Pressure; ANCOVA, Analysis of Covariance.

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Previous studies have proved the positive impact of knowledge in hypertension control.^{7–9} Knowledge intervention has been found to improve medication adherence and lifestyle behaviors and thereby significantly decreased blood pressure levels.^{10,11}

Although the existing literature confirms the positive impact of knowledge intervention, comparison of the forms and frequencies of the intervention; and their differential impacts on adherence and management were not the focus. The present study attempts to the fill this gap.

The objective of the study is to measure the differential impact of knowledge intervention in two forms and frequencies on adherence and management of hypertension.

2. Method

2.1. Study setting

The study design and procedure were approved by the institutional ethics committee of the University of Hyderabad (Approval Number UH/IEC/2014/22 dated 08th September 2014).

This quasi-experimental study was conducted in Hyderabad, India by adopting a pre-test post-test non-equivalent group design that consisted of five groups. Group 1 and Group 2 received Knowledge Intervention in Direct Interaction (DI) form, where a qualified doctor explained hypertension related knowledge directly to the participants. Group 3 and Group 4 received Knowledge Intervention in video form. While Groups 1 and 3 were exposed to the Knowledge Intervention only once, Groups 2 and 4 were exposed to repeated inputs (twice) in a gap of 15 days. Group 5 was the control group that received only standard medical care.

2.2. Participants

Participants were recruited based on inclusion criteria: a) the patients have been diagnosed with primary hypertension for at least a year; b) the patients expressed willingness by signing the informed consent form. The patients were excluded from the study if they were diagnosed with secondary hypertension or any associated illness such as diabetes mellitus, thyroid, and arthritis. After screening 1050 participants based on purposive sampling, a total of 450 were recruited. Using serial assignment method, this sample was allotted to one of the five groups. After sample attrition and removal of outliers 256 participants continued till the end of the study.

The sample consisted of 53.3% men and 46.7% women with age ranging between 30 and 65 years ($M = 52.2$, $SD = 8.31$). The mean duration of illness was 5.42 years ($SD = 5.07$). The sample consisted of persons with primary education (18.8%) high school (17.6%), intermediate (27.3%), graduates (24.2%) and professionally educated (12.1%).

2.3. Tools

The baseline and follow up assessments were carried out by using the following tools *Hypertension Knowledge Test (HKT)*: This is a 22-item multiple choice test of knowledge about hypertension. The knowledge is measured among four domains: general awareness; lifestyle factors; causes, care and casualty awareness; and medication management. The test-retest reliability was found to be .92 ($p < .001$). The construct validity with systolic blood pressure readings was found to be $-.28$ ($p < 0.001$) diastolic blood pressure at $-.22$ ($p < 0.001$).¹²

Hypertension Compliance Scale (HYCOMPS): This is a 15-item scale with a 4-point response measure. It has four domains viz

adherence to medication, diet, exercise and self-monitoring. The Cronbach's α was found to be .67¹³

Blood pressure recording: The patients' blood pressure reading was measured between 10 and 11 a.m. by a standard mercury sphygmomanometer and converted into the Mean Arterial Pressure (MAP) using the standard formula.

Knowledge Intervention: The contents for knowledge intervention were structured taking salient points from Joint National Committee's (JNC-8) guidelines. It was validated by a team of three experts comprising of a cardio-thoracic surgeon, general physician and a medical scientist. The script was the same for direct and audiovisual presentation, the duration of which was 30 min.

2.4. Procedure

On their arrival the participants were requested to relax for 15 min before the first reading of B.P. was taken. They were seated comfortably with back support and the participants arm was supported at the heart level. Three B. P. readings were taken within a gap of 5 min between each reading. The mean value of the three readings was recorded. Participants were administered the Hypertension Knowledge Test and Hypertension Compliance test (pretest). The recruited participants were then assigned to the five groups in a sequential manner. Out of 256 participants, 50 participants were in Direct Interaction Double (DID) group, 51 in Direct Interaction Single (DIS) group, 51 in Audio Visual Double (AVD) group, and 51 in Audio Visual Single (AVS) group while 53 were in Control group.

The participants in groups of 30 or less were exposed to the interventions. The DID group were exposed to an intervention where the physician presented the content to the group through power point presentation. This was repeated for a second time within a gap of 15 days. The DIS group was exposed to the presentation by the physician only once. The AVD group was exposed to the audiovisual presentation of contents twice with a gap of 15 days while the AVS group was exposed to the intervention only once. The participants were administered HKT and HyCompS post intervention. Their blood pressure was measured in the 6th week after exposure to the intervention.

2.5. Statistical analyses

Data was analyzed using the IBM SPSS Statistic 20.0 version. The study being a pretest posttest design, the Analysis of Covariance (ANCOVA) was used for the purpose of controlling the effect of pre-intervention scores on the post intervention scores. The corresponding pre-intervention score of the variable was considered as the covariate.

3. Results

The five groups were compared on their post-test knowledge, adherence, and hypertension management using Analysis of Covariance (ANCOVA). Separate ANCOVAs were carried out to find the differences among the five groups post intervention on knowledge and its four dimensions, adherence and its four dimensions, and mean arterial pressure readings. Multiple group comparison was carried out using the Bonferroni method. The levels of significance are mentioned in the table.

3.1. Impact of intervention on adherence

Tables 1 and 2 presents the results of ANCOVA and Bonferroni Multiple Group Comparisons on the overall adherence and its four dimensions in the post intervention test on the five groups.

Table 1

Results of one-way ANCOVA with estimated marginal means, standard errors, effect sizes (η^2) for post-intervention adherence and its variables.

Groups	Means (Standard Errors)					F(4,250)	η^2
	DIS	DID	AVS	AVD	Control		
Adherence Overall	49.72 (.84)	51.68 (.83)	47.75 (.83)	47.57 (.83)	37.97 (.81)	41.36***	.39
Medication	26.23 (.53)	26.67 (.53)	25.85 (.53)	25.16 (.53)	20.07 (.52)	26.23***	.29
Diet	11.45 (.09)	11.78 (.09)	10.94 (.23)	11.08 (.23)	8.25 (.23)	36.22***	.36
Exercise	7.36 (.25)	8.03 (.25)	7.57 (.25)	7.87 (.25)	6.32 (.25)	7.11***	.10
Self – monitoring	4.65 (.21)	5.20 (.21)	3.40 (.21)	3.45 (.21)	3.32 (.20)	16.58***	.21

Note. DIS = Direct Interaction Single, DID = Direct Interaction Double, AVS = Audio Visual Single, AVD = Audio Visual Double; * = $p < .05$, ** = $p < .01$, *** = $p < .001$.

Table 2

Results of Bonferroni multiple Group comparisons on adherence and its dimensions.

Multiple comparisons	HyCompS Overall	HyCompS-Medication	HyCompS-Diet	HyCompS-Exercise	HycompS-Self-Monitoring
DIS ~ DID	-1.95	-.44	-.32	-.66	-.54
DIS ~ AVS	1.97	.37	.51	-.21	1.25***
DIS ~ AVD	2.15	1.06	.36	-.51	1.19**
DIS ~ Control	11.75***	6.15***	3.20***	1.04*	1.33***
DID ~ AVS	3.93*	.81	.84	.45	1.80***
DID ~ AVD	4.11**	1.50	.69	.15	1.74***
DID ~ Control	13.71***	6.60***	3.53***	1.70***	1.87***
AVS ~ AVD	.18	.69	-.14	-.29	-.05
AVS ~ Control	9.78***	5.78***	2.69***	1.25**	.07
AVD ~ Control	9.59***	5.09***	2.83***	1.55***	.13

Note. DIS = Direct Interaction Single, DID = Direct Interaction Double, AVS = Audio Visual Single, AVD = Audio Visual Double; HyCompS = Hypertension Adherence. * = $p < .05$, ** = $p < .01$, *** = $p < .001$.

It is inferred from Table 1 that there are significant differences between the groups on Overall Adherence $F(4,250) = 41.36$, $p < .001$, Adherence to Medication $F(4,250) = 26.23$, $p < .001$, Adherence to Diet $F(4,250) = 36.22$, $p < .001$, Adherence to Exercise $F(4,250) = 7.11$, $p < .001$, and Self-Monitoring $F(4,250) = 16.58$, $p < .001$.

It is observed from Table 2 that the Control Group significantly differed from all the intervention groups on overall adherence, Adherence to Medication, Diet and Exercise. Further both the direct interaction groups significantly differed from the audio-visual groups on the dimensions of self-monitoring. A detailed scrutiny of the mean scores from Table 2 broadly gives an impression that the DID Group had a higher level of Overall Adherence and its dimensions. A further examination revealed that DID Group did not significantly differ from DIS Group on Overall Adherence and its dimensions. However, DID Group scored significantly higher on Overall Adherence ($M = 51.68$, $SE = 0.83$) compared to AVS ($M = 47.75$, $SE = .83$, $p < .05$) and AVD ($M = 47.57$, $SE = .83$, $p < .01$). Similarly, DID Group was found to have higher level of Adherence ($M = 5.20$, $SE = .21$) compared to AVS ($M = 3.40$, $SE = .21$, $p < .001$) and AVD ($M = 3.45$, $SE = .21$, $p < .001$) on Adherence to self-monitoring. The DIS Group scored significantly higher on self-monitoring ($M = 4.65$, $SE = .21$) compared to AVS Group ($M = 3.40$, $SE = .21$, $p < .01$) and AVD Group ($M = 3.45$, $SE = .21$, $p < .001$).

3.2. Impact of intervention on management of hypertension

Tables 3 and 4 present the results of ANCOVA and Bonferroni multiple group comparison on hypertension management measured by Mean Arterial Pressure (MAP) readings of the five groups in the post intervention phase.

It is inferred from Table 3 that there are significant differences between the groups reflected in post intervention mean arterial pressure readings $F(4,250) = 41.36$, $p < .001$. Table 4 suggests that

Table 3

Results of one-way ANCOVA with estimated marginal means, standard errors, effect sizes (η^2) for post-intervention hypertension management (mean arterial pressure readings).

Groups	Means	Standard Errors	F (4,250)	η^2
DIS	98.42	.53	15.31***	.19
DID	96.94	.52		
AVS	99.83	.52		
AVD	100.28	.52		
Control	102.36	.51		

Note: 1. Covariate was evaluated at pretest controlled mean value of 104.07. 2. *** $p < .001$.

Table 4

Results of bonferroni multiple group comparisons on blood pressure readings.

Multiple comparisons	Hypertension Management (Blood Pressure Readings)
DIS ~ Control	3.94***
DID ~ Control	5.42***
AVS ~ Control	2.53**
AVD ~ Control	2.08
DID ~ AVS	2.88**
DID ~ AVD	3.34***
AVS ~ AVD	.45
DIS ~ DID	1.48
DIS ~ AVS	1.40
DIS ~ AVD	1.85

Note. DIS = Direct Interaction Single, DID = Direct Interaction Double, AVS = Audio Visual Single, AVD = Audio Visual Double; ** = $p < .01$ *** $p < .001$.

the Control Group significantly differed from all other groups except the AVD Group in managing the blood pressure on post intervention phase. Further, it is also observed that the group exposed to DID showed a significant lower level of mean arterial pressure ($M = 98.42$, $SE = .53$) compared to the group exposed to AVS ($M = 99.83$, $SE = .52$, $p < .01$) and AVD ($M = 100.28$, $SE = .52$, $p < .001$).

4. Discussion

The findings of the study clearly indicated the positive impact of knowledge interventions not only in improving adherence but also in effective management of hypertension in patients. The results revealed the efficacy of the direct interaction compared to audio-visual form. Findings clearly indicated the positive role of repeated exposure only in direct interaction and its counterproductive impact in audio visual double form.

4.1. Impact of form and frequency on Adherence behavior

The results clearly indicated that all intervention groups showed higher level of overall adherence and specifically in adherence to medication, diet, and exercise compared to the Control Group. This clearly suggests that cognitive base created by exposure to hypertension knowledge translated into strengthening positive behaviour related to clinical adherence. A number of studies have established a positive relationship between communication and adherence,^{13,14} information exposure and adherence,¹⁵ group orientation and adherence.¹⁶ It may be relevant to state here that only when the communication packed in intervention suits the target groups in its content, medium (language) and form will it have an effective outcome that is intense enough to translate from cognition to behaviour.^{17,18}

There was no impact of the form of intervention on adherence levels in general but the effect of form of intervention was seen on the dimension of adherence to self-monitoring. In case of self-monitoring the groups that received intervention through direct interaction were found to have higher levels of adherence compared to their counterparts who received intervention through audio visual form. Self-monitoring demands sustenance in behavior. Unless the message about the significance of self-monitoring is strong in content, form and frequency, it is difficult to persevere after initiating the same.

Efforts at fighting hypertension should be a team work. The finding that audiovisual medium is effective in enhancing cognitive base provides an insight that the same can be extended to social media. While Health Psychologists prepare effective cognitive modules nursing professionals can routinely disseminate the knowledge using social media and ensure adherence through regular feedback.

4.2. Impact on management of hypertension

The results broadly indicated an effective blood pressure management reflected in Blood Pressure values in the intervention groups compared to the Control Group. The results found significant control over the blood pressure levels in all the intervention groups except the one which had repeated exposure to audio visual form of cognitive intervention. Though this group was found to have a lower level of blood pressure compared to the pre-intervention readings, the readings were more comparable to the Control Group.

Audio visual intervention is the one where the target group is a passive recipient of information. Repeated exposure to the contents that includes explanations of serious consequences of uncontrolled hypertension gives rise to fear and anxiety. There are a number of studies relating heightened levels of blood pressure to state anxiety.^{19,20} The other reason could be the resultant desensitization by repetition of information and denial as a consequence of repeated exposure. The study by Van't Riet and Ruiter²¹ supports this finding that repeated exposure to health promoting information may result in disregard, denial, or dismissal of the very information. Such reactions may lead to a casual attitude towards the core message

thereby rendering the intervention futile. In fact, there are reports that while majority of interventions culminate in benefitting the target group, in about 6% of studies it was counterproductive by worsening the conditions²²

Positive feedback on effective management of hypertension goes a long way in sustaining the same. Since nursing staff are the people who take the Blood Pressure reading, they, along with the training from Health Psychologists can provide positive reinforcement to those where the hypertension is effectively managed and counsel those where the management needs better coping.

5. Conclusion

It was found that the combination of direct interaction form and repeated exposure significantly brought down the B.P readings suggesting an effective hypertension management. The reasons for this could be that the very physical presence of the physician on two occasions might have had a reassuring effect on the participants. Research studies proved the positive impact of the physician's presence on prognosis.^{23–25} The findings clearly indicated a positive impact of knowledge intervention on the patients with hypertension. It enhanced the cognitive base related to hypertension, improved adherence and blood pressure levels in post intervention phase.

Repercussions of uncontrolled hypertension are severe and sometimes irreversible. In majority of cases lack of knowledge and complacency are found to be the cause of low or non-adherence. This can be easily handled by knowledge intervention which is cost effective and viable within the clinical set up. In countries where the doctor patient ratio is high when compared to WHO norm, knowledge intervention can constitute an integral part of treatment regimen initiated by Health Psychologists and trained Nurses.

What is already known?

- Knowledge intervention can improve hypertension compliance and management

What does this study add?

- The Knowledge intervention is most effective when it was given by a medical professional at least twice.
- Repeated exposure of recorded knowledge intervention may be counter effective.

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Declaration of competing interest

The Authors declare that there is no conflict of interest.

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