

Available online at [www.sciencedirect.com](http://www.sciencedirect.com)

ScienceDirect

journal homepage: [www.elsevier.com/locate/ihj](http://www.elsevier.com/locate/ihj)

## Original Article

# Barriers to cardiovascular disease risk reduction: Does physicians' perspective matter?



Carolyn Elizabeth George<sup>a,\*</sup>, Dhanya Ramadas<sup>a</sup>, Gift Norman<sup>b</sup>,  
Devashri Mukherjee<sup>a</sup>, Tata Rao<sup>a</sup>

<sup>a</sup> Department of Community Health and Family Medicine, Bangalore Baptist Hospital, Hebbal, Bellary Road, Bangalore 560024, Karnataka, India

<sup>b</sup> Professor and Head, Department of Community Health and Family Medicine, Bangalore Baptist Hospital, Hebbal, Bellary Road, Bangalore 560024, Karnataka, India

## ARTICLE INFO

## Article history:

Received 2 April 2015

Accepted 17 August 2015

Available online 12 January 2016

## Keywords:

Cardiovascular disease

Risk factors

Physicians

Convergent parallel design

## ABSTRACT

**Background:** Cardiovascular disease (CVD) is emerging as a major epidemic and the leading cause of death and disability in India. This study is an attempt to understand the barriers and challenges faced by physicians in CVD risk reduction in a rural setting.

**Methods:** The study was conducted among 34 physicians across six randomly selected villages of Bangalore Rural District. Convergent parallel design was used to combine the strengths of qualitative and quantitative approaches to develop a stronger understanding of the experiences and challenges of practicing physicians in reducing the risk of CVD in this region. After concurrently collecting the data, rigorous procedures for both quantitative and qualitative methods were used independently and then merged to provide an enhanced understanding of the research question.

**Results:** Lack of knowledge and understanding of the disease, myths and beliefs, attitude of the patients, non-adherence to lifestyle changes and medications, the chronic nature of the disease, financial constraints, and lack of national guidelines were identified as the major barriers.

**Conclusion:** This study highlights the challenges faced by physicians in dealing with the increasing number of patients presenting with CVD risk factors in rural areas. It also suggests options that could minimize these barriers, enabling them to manage their patients with CVD risk in the best way possible. It is critical to institute guidelines and algorithms to manage these risk factors in the rural Indian context.

© 2015 Cardiological Society of India. Published by Elsevier B.V. All rights reserved.

## 1. Introduction

According to the World Health Report 2002, cardiovascular diseases (CVD) will be the largest cause of death and disability in

India by 2020.<sup>1</sup> It is the first among top five causes of deaths in the Indian population (rural vs. urban, economically backward vs. developed states, men vs. women and at all stages vs. middle age).<sup>2</sup> CVDs are expected to be the fastest growing chronic illness by 2015 growing at 9.2% annually from 2000 onwards.<sup>3</sup>

\* Corresponding author.

E-mail address: [carolinelizabethj@gmail.com](mailto:carolinelizabethj@gmail.com) (C.E. George).

<http://dx.doi.org/10.1016/j.ihj.2015.08.014>

0019-4832/© 2015 Cardiological Society of India. Published by Elsevier B.V. All rights reserved.

CVD, till recently, was considered as an urban epidemic; however, recent studies have reported high prevalence of CVD risk factors even in rural areas.<sup>4–6</sup> According to population-based cross-sectional surveys in 2003, the prevalence was estimated to be 3–4% in rural areas and 8–10% in urban areas.<sup>7</sup>

Risk factor modification can reduce clinical events and premature death in people with established CVD as well as in those who are at high cardiovascular risk due to one or more risk factors.<sup>8</sup>

Despite widespread awareness among clinicians about primary and secondary CVD prevention goals, the application of these interventions into their practice seems far from optimal.<sup>9</sup>

There are barriers, both from the patient as well as physicians sides that may have an effect on risk reduction especially in rural areas.

Little is known about what the physicians perceive as barriers to CVD risk reduction in rural setting areas. This study elaborates the barriers perceived by physicians in managing modifiable CVD risk factors, such as hypertension and diabetes, in the context of reducing CVD risk in rural resource constrained settings.

## 2. Methods and materials

For the purpose of this study, six villages were randomly selected from Devanahalli Taluk (sub-district) of Bangalore Rural District. They were Bommavara, Solur, Chikksonne, Kanamangala, Illthore, and Singarahalli. There were only two doctors in-toto for all the listed villages. A sample survey conducted in 30 households in each of these villages revealed that the majority of people from these villages go to Devanahalli (Sub-district headquarters situated 8–12 km from these villages), to avail medical services. Hence, the private clinics, nursing homes, primary health centers, and government hospitals in Devanahalli were mapped and the doctors were contacted for the survey.

We used convergent parallel design to elaborate on the multi-dimensional aspects of the stated problem and to better understand the experiences of the physicians in attaining CVD risk reduction. The research questions were broad, so as to accommodate both quantitative (questionnaire) and qualitative (in-depth interview) research methods.

The purpose of the convergent design is “to obtain different but complementary data on the same topic”,<sup>10</sup> to best understand the research problem and to bring together the differing strengths and non-overlapping weaknesses of quantitative methods.<sup>11</sup> We used this design to synthesize complementary quantitative and qualitative results to develop a more complete understanding of the phenomenon and to triangulate the data to enhance the validity of the results.

Overall, 42 doctors were contacted over the phone and informed about the purpose and methods of the study. All these doctors were either working in the government healthcare system (PHC, CHC, Taluk hospital) or engaged in private practice in Devanahalli Taluk; though they may not reside within the Taluk. Few resided in Bangalore town and commuted to their place of practice in Devanahalli. The doctors from the listed villages (Bommavara, Solur, Chikksonne,

Kanamangala, Illthore, and Singarahalli) were also included. Of the 42 contacted, 36 consented to participate in the study and gave an appointment for an interview. Six doctors refused to be part of the study, due to lack of time (12), lack of interest<sup>10</sup> and poor CVD patient load.<sup>1</sup> Finally, among 36 doctors who agreed to be interviewed, 34 were interviewed, as two were out of station during the study period.

A team consisting of a doctor and health worker met each doctor on the scheduled date and time for the interview. The doctor explained the purpose and the procedure of the study. Written informed consent was taken before enlisting them into the study.

The data collection was carried out in two phases. The physician was requested to complete a pre-tested questionnaire followed by an in-depth interview.

The questionnaire comprised of demographic details, their professional qualification/s, years of experience, details of CVD training undergone and an approximate estimate of the patients with CVD risk. They were then asked about the guidelines used for managing hypertension and diabetes and to rate their confidence in managing CVD on a scale of 1–10; 1 being least and 10 highly confident. Subsequently, there were six statements pertaining to the barriers which they had to mark 'Yes or No' based on their experience. These statements were

1. The attitude of the patient is a major determinant in managing hypertension and diabetes
2. Most of my patients come regularly for follow-up
3. My patients take drugs on a regular basis
4. I spend equal or more time in counseling a patient as compared to prescribing drugs
5. I am compelled to change my drugs due to non-availability of drugs
6. Financial constraints among patients is a major barrier in managing hypertension and diabetes

The questionnaire ended with two open ended questions on barriers and their suggestions to overcome the same. The completion of the questionnaire took between 15 and 22 min

After the questionnaire was completed, the researcher interviewed the physician regarding the barriers to CVD risk reduction and management. Corbin and Strauss' strategies for qualitative research<sup>12</sup> were used to guide data collection. The interview started with asking about the regular patients with hypertension or diabetes that they commonly encountered in their clinical practice.

The semi-structured interview guide contained the following prompts:

- In your practice, do you see patients with diabetes and hypertension?
- Do you face difficulties in managing these conditions?
- Can you describe the challenges you face in diagnosing them?
- In your experience, what are the challenges in achieving control of blood pressure and blood sugar?

The interviewer probed further to attain clarity about each barrier. The entire conversation was recorded by the health

worker and summarized back to the physician to ensure validity. They were assured that the information provided by them will be used only for academic purposes with identifiers removed.

All the interviews were conducted at their place of practice and the time ranged from 43 min to 92 min (average of 52 min). In accordance with the conventions of thematic analysis, recruitment ceased when no new information emerged from the interviews.

The study was approved by the Institutional Review Board of the hospital.

### 3. Statistical analysis

Quantitative data (self-administered questionnaire) were analyzed using descriptive statistics and inferential statistics. The qualitative data (in depth interviews) underwent the rigorous procedures of theme development and those specific to the qualitative approach. Inductive thematic analysis, whereby themes are generated from the data as opposed to a pre-existing thematic framework, was performed concurrently with interviews until thematic saturation was reached, in accordance with the methods described by Corbin and Strauss.<sup>12</sup> Journal entries and memos were included in the analysis. Thematic analysis followed an iterative approach, whereby as new themes were identified and added to the thematic framework, earlier transcripts were re-coded.<sup>12</sup> Later both data were compared, contrasted, and interpreted to develop a conceptual matrix.

In-depth interviews were transcribed and translated verbatim. A preliminary analysis was conducted in order to get a general sense of the data and to reflect on its meaning. The data went through several phases of analysis so as to accommodate inductive, data-driven thematic analysis. After familiarizing the data, the data were open coded in a systematic fashion based on repetitive words and concepts. Each datum was given equal attention in the coding process. Comparative analysis was done repeatedly to compare data to the categories to determine consistency in coding the data. Each code (quality criteria) had to have a supporting sentence, extracted from the one-to-one interview and a relevant comment added by the researcher. The coding was done till no more new categories emerged from the data. In the next stage, the codes were collated into potential themes gathering all data relevant to each potential theme. Themes were repeatedly checked against each other and back to the original data set to ascertain that the themes are internally coherent, consistent, and distinctive. Further, the themes were analyzed to explain the core phenomenon, causal conditions, strategies, and consequences through axial coding by connecting themes. Rigor was addressed by: repeated coding of transcripts by different team members to ensure a comprehensive themes list, and framework was achieved; an iterative process of constant comparison between the existing framework and new data; detailed documentation of the analysis process; and discussion of emerging and final themes with all the authors.

The data were triangulated further to validate the findings guided by the triangulation protocol of Farmer.<sup>13</sup> The researchers first analyzed the data independently (sorting,

convergence coding, convergence assessment, and completeness assessment). Next, consensus on the key themes emerging from the data was reached through discussion (researcher comparison). A summary of the triangulated results was sent for review to a senior researcher who agreed with the results.

The quantitative data were analyzed using SPSS version 16. Descriptive analysis was done for all the variables. Frequency and percentages were calculated for categorical variables. Mean and standard deviation was calculated for continuous variables.

The content areas represented in both data sets were further merged to compare, contrast, and synthesize the results.

### 4. Results

The baseline characteristics of the physicians were described in Table 1. Most (58.8%) of the physicians were less than 50 years old with a mean age of  $45.79 \pm 16.12$  years. 62% of them were males. Mean duration of practice was 13 years. 58.82% were working in the government sector. Most of them (73.53%) had undergone Continuing Medical Education sessions in managing hypertension and diabetes in the past 5 years.

Almost a quarter (18%) of the doctors attended to nearly 20–30 patients per day. Many doctors (58.8%) reported that less than 50% of their patients achieved recommended control. Majority of the physicians (64.7%) attributed poor control to non-compliance to drugs.

When asked to rate their confidence in managing diabetes and hypertension on a scale of 1–10, 1 being lowest and 10 being highest, 95.2% of them rated themselves 5 or above. Average confidence score was  $6.21 \pm 1.5$ . The confidence level positively correlated with age ( $r = 0.50$ ,  $p = 0.00$ ) and years of practice ( $r = 0.48$ ,  $p = 0.00$ ).

Majority (76.47%) of the physicians did not follow any specific guidelines in managing their patients. The rest said that they followed the guidelines of the American Diabetic Association (ADA) and Adult Treatment Panel (ATP) III (Table 2).

**Table 1 – Baseline characteristics of the participants.**

Parameter	n = 34 Percentage (no.)
Male	61.8 (21)
Mean age	$45.79 \pm 16.12$
Mean years of practice	$17.6 \pm 15.4$
Government sector	58.8 (20)
MD/Diploma	79.4 (27)
Training attended in last 5 years	73.5 (25)
Mean number of CVD patients/day 5–10	44.1 (15)
Proportion of patients with good control 25–50%	38.2 (13)
Mean self-rated confidence in managing HTN and DM	$6.21 \pm 1.5$

Values are percentages (numbers) unless stated otherwise.

**Table 2 – Common barriers to CVD risk reduction as perceived by the physicians.**

Statements	Agree	%
My patients do not take drugs on a regular basis	22	64.7
I spend equal or more time in counseling a patient as compared to prescribing drugs	18	52.9
I am compelled to change my drugs due to non-availability of drugs	6	17.6
Financial constraints of the patients are a major barrier in effective control of chronic disease	26	76.5
Attitude of the patient is a major determinant in managing the disease condition effectively	28	82.4
Most of my patients do not come regularly for follow-up	13	38.2

**Table 3 – Prioritization of common barriers to CVD risk reduction by the physicians.**

Barrier	Barrier of first priority		Barrier of second priority		Barrier of third priority	
	No	%	No	%	No	%
Non-compliance	13	38.2	8	23.5	5	14.7
Lack of understanding of the disease	8	23.5	7	20.6	4	11.8
Difficult access	6	17.6	1	2.9	0	0.0
Financial constraints	4	11.8	10	29.4	15	44.1
Attitude of the patient	2	5.9	3	8.8	2	5.9
Lack of social support	1	2.9	0	0.0	0	0.0
Many opinions from different physicians			1	2.9	2	5.9
No standard guidelines			3	8.8	1	2.9
Seek alternate medicine first			1	2.9	0	0.0
Poor explanation by doctors					2	5.9
Too much advice from different people					2	5.9
Doctor shopping					1	2.9

Quantitative analysis of the questionnaire revealed poor compliance (38.2%), lack of understanding of the disease (28.5%), difficulty in accessing health care (17.6%), and financial constraints (11.8%), as the primary barriers for CVD risk reduction (Table 3).

The themes which emerged during analysis of in depth interviews (Table 4) were as follows.

#### 4.1. Knowledge distortion

All the physicians reported that diabetes and hypertension were associated with a lot of misconceptions, which interfered with diagnosis and management of these conditions. "Most patients underestimate diabetes and hypertension, they do not believe that it can lead to many complications". "Modern medicine cannot cure diabetes or hypertension, but ayurveda can. ...that's what most of my patients believe" another practitioner said. Many physicians claimed that many of their patients after diagnosis, go for traditional medicine and come back to them when complications develop.

"Once we start medicines, the body gets addicted to these drugs, many patients believe." This belief compels them to try other alternatives and keep modern medicine as the last resort for their condition. Many physicians also expressed that their patients also feared about the side effects of lifelong medication.

Myths and beliefs were also closely linked with lifestyle modifications and drug compliance.

"I know when my pressure is high, when my sugar is high. I need to take my medications at that time: many patients say like this."

"Diabetics should not eat any fruits, I do not know who gives them all this information" another frustrated doctor said.

Many physicians reported that though sweet and high in calories, honey is considered beneficial by many of their patients. Another interesting phenomenon was their belief in the buffering effect of bitter food stuffs.

"If I take sugar, I will drink bitter gourd juice, then I do not have to worry about my sugar, one patient told me"

"Many believed that diabetics cannot eat rice at all. have to eat only chapatti and no snacking. Fearing all these, they prefer to be in denial"

Many physicians pointed out that once the sugar or BP becomes normal with medications, people tend to reduce or stop medications. They feel they do not need the medications.

#### 4.2. Non-compliance

Majority (64.7%) of doctors reported that their patients were not taking their medications regularly. Financial constraints and chronic nature of the disease were reported as the major barriers to drug compliance. "Once you are a diabetic, they need to take medications lifelong. On an average, they have to spend at least Rs. 200 a month. They are not motivated to keep on spending this amount. Sometimes it's difficult when they have to decide between drugs and other things like food, education etc." Another important determinant of compliance is the lack of patient's perceived benefit of the drugs. "Even though I tell the patient the importance of taking drugs, they do not always feel that they are using their money efficiently". We see patients getting heart attacks and strokes, we know how dangerous it is not to take drugs. But since they have done this several times and nothing happened to them. This behaviour gets reinforced. Most people feel that nothing happens if

**Table 4 – Basic themes emerging from qualitative data analysis.**

Concepts basic (Open codes) Illustrative quotes	Organizing theme	Global theme
<b>Lack of knowledge and understanding of the condition:</b> “If I take sugar, I will drink bitter gourd juice, then I do not have to worry about my sugar. This was statement by one of my patients” (D18, 25yr, MBBS)	Knowledge distortion	Patient related
<b>Belief in natural remedies alternative to medicine:</b> “Modern medicine cannot cure diabetes or hypertension, but Ayurveda can. thats what most of the patients believe. In the initial stages, they want to go to these traditional practitioners” (D9, 60yrs, MD General Medicine)		
<b>Myths about diet:</b> “Diabetics should not eat any fruits or rice, I do not know who gave them all these information” (D22, 50 yrs, MD OBG)	Attitude of patients	
<b>Resistance to start medications:</b> “Once we start medicines, the body gets addicted to them, many patients believe like this.” (D6, 42, MD Pediatrics)		
<b>Lack of motivation:</b> “There are some patients who are concerned about their health...and they trust us. Another set of patients are very difficult to handle.” (D3, 30 yrs, MD Medicine)		
<b>Financial constraints:</b> “Once you are a diabetic, they need to take medications lifelong. On an average, they have to spend at least Rs. 200 a month. They are not motivated to keep on spending this amount. Sometimes it's difficult when they have to decide between drugs and other things like food, education etc.” (D11, 62 yrs, MS Surgery)	Non adherence	
<b>Self-management:</b> “Once the sugar is normal or BP is normal with medications, many people will reduce or stop medications. They feel they can manage without drugs.” (D16, 50 yrs, MD Pathology)	Nature of disease	Condition related
<b>Polypill:</b> “Two for sugar, one for BP, one aspirin. you know too many medications. Sometimes its not surprising that they discontinue and try.” (D5, 58 yrs, MD Medicine)		
<b>Chronicity:</b> “Diabetes is not like fever or diarrhoea. once a diabetic always a diabetic” (D27, 43 yrs, MS ENT)		
<b>No immediate effect if sugar is high:</b> “No immediate consequence for noncompliance, unlike pain or something”. . .In a way, they are also correct, nothing happens to many: unexplained phenomenon.” (D19, 50 yrs, MBBS)	Competency	Provider related
<b>Confusion about guidelines:</b> “The guidelines change very often, we passed out long back. Sometimes keeping up with the new trends is difficult.” (D31, 68 yrs, MBBS)		
<b>Inadequate information sharing:</b> “I will tell to exercise and reduce rice to all diabetics” (D10, 55 yrs, MD Medicine)		
The age and qualifications of the doctors are real.		

they miss tablets for a week” a physician said. “Of the many options that money can buy, tablets seem to be the least gratifying, it's tough to motivate them” another doctor disclosed. However, almost all of the doctors said that giving medications free does not increase compliance.

“If the blood sugar is high, patient does not feel anything. Many times it is a blood finding. So you know, even if ketones are present people will say I will go home and come later.” One doctor said. “No immediate consequence for noncompliance, like pain or something like that”. . .In a way, they are also correct, nothing happens to many immediately”, a renowned practitioner said.

“Many patients are misdirected to some traditional herbal practitioners who claim quick fix remedies without side effects. . .They cut down the medications, 2 tablets will become 1, but they will never tell me. Suddenly they will land up with complications”, another doctor told.

61.8% of doctors reported that most of their patients come regularly (at least once in 3 months) for follow-up. Some doctors said that many patients go to the local pharmacy and buy over the counter medications instead of visiting a doctor. “I may also prescribe the same medications but I will also look for complications, which the patients will miss if they take over the counter medications.” a private practitioner told. “Some patients are scared of their results that they tend to give some excuse to skip

their doctor visit, their relatives or spouses have to literally threaten them to come to see the doctor”, another government doctor reported.

Most of the physicians reported that the patients who are controlled are the ones who come regularly for check-up. They are more eager to know about the disease and how to control it. They are compliant to lifestyle modifications and drugs. They take accountability and are actively involved in managing the disease along with their physicians.

#### 4.3. Attitude of the patients

Neglect and indifference among their patients are the most difficult traits the doctors dread. “There are some patients who are concerned about their health...and they trust us. Another set of patients are very difficult to handle. They are very indifferent about their disease condition, complications. They come to visit us once in a while, but health is not at all their priority.” All the physicians agreed that the attitude of the patient is one of the most important factors contributing to the successful management of chronic disease. Physicians felt powerless whenever they encountered neglect or indifference.

#### 4.4. Nature of the disease

Many physicians felt that the chronicity of the disease poses many challenges to their effective control. “Diabetes is not like

fever or diarrhoea. once a diabetic always a diabetic. You can never cure it". Having a long asymptomatic phase and the silent likelihood of complications were identified as main challenges. Chronicity also attracts many players, traditional practitioners and healers. It also drains financial resources.

Diabetes and hypertension require patients to modify their lifestyles which is often very difficult for them. "Most people cannot afford fruits. Moreover they are not used to it. They eat two meals, a lot of rice, ragi and some vegetables. Exercise with an aim to remain healthy is not part of the rural lifestyle. They go to work in the morning and come back in the evening. "Changing lifestyles they acquired over several years is very tough".

**4.5. Competency and inadequate information sharing**

Many physicians admitted that they are unable to give adequate counseling to their patients due to time constraints. "It takes a lot of time, patients already come with a baggage of myths and beliefs with them. It requires lots of patience. we do not have time" one practitioner said. Almost all the physicians expressed frustration about the amount of counseling and motivation required for managing these disease conditions.

*"The guidelines change very often, we passed out long back. Sometimes keeping up with the new guidelines is difficult. . .Some guidelines will say this, another will say don't do that. It's very complicated."*

All the physicians said that they do counseling. But on prompting, the majority were not able to give the key messages that they give during the counseling. "I will tell to exercise and reduce rice to all diabetics".

The physicians were asked about suggestions to overcome these barriers. All the physicians suggested mass awareness programs to saturate the community with correct information regarding diabetes and hypertension. "Healthy habits (healthy diet and exercise) has to be inculcated at a very early age", one physician opined. The physicians also suggested that standard management algorithms should be established for diabetes and hypertension. Drugs should be made available and supplied regularly at affordable costs. Easy accessibility of health care centers should also be considered.

**5. Discussion**

The study gives a thorough understanding of the barriers as perceived by the physicians in managing hypertension and diabetes among their patients. Lack of knowledge and understanding of the disease in the community pose an enormous challenge to the treating physicians. This situation is made worse by the alternate systems of medicine and traditional healers. Traditional practitioners offer many curative options for the early asymptomatic phase of diabetes and hypertension. They create undue fear among patients about lifelong medication and side effects of chemical medicines. Undue belief in herbal and ayurvedic treatments has been reported in the studies conducted in other parts of India. The buffering effect of bitter foodstuff has been reported in many studies in India as well as in other countries.<sup>14-18</sup>

Non-adherence is also a complex phenomenon that has emerged in this study. Since elevation of blood pressure and blood sugar is often asymptomatic, patients are not motivated to take medications on a continuous basis. Non-compliance is also linked to financial constraints or to the inconvenience caused by the need of taking multiple pills every day. Lack of perceived benefit by patients of physician visit and drugs were another phenomenon linked to non-adherence. The TRIAD study by Crosson et al. and another study by Toni et al. also reported financial constraints and family issues as a major cause for non-adherence and a hindrance to CVD risk reduction.<sup>19,20</sup>

The physicians also reported their difficulty in dealing with multiple guidelines and inability to cope up with recent updates. They were overwhelmed by the multiple guidelines which in turn paralyzed them during patient encounters. Doctors also expressed their difficulty in finding time to counsel their patients regarding lifestyle modifications and non-compliance. Though a majority of them expressed confidence in dealing with these diseases, they reported that almost half of their patients were uncontrolled.<sup>21</sup>

Physicians also identified negligent and carefree attitude of the patients as a major barrier to CVD risk reduction. Although these are a small subset of patients, the practitioners articulated that these patients are difficult to deal with and were the ones who often ended up with complications. A

**Table 5 – Barriers to CVD risk reduction: a conceptual framework.**

<b>Contextual conditions</b>			
<ul style="list-style-type: none"> <li>Rural settings</li> </ul>			
<b>Causal conditions</b>	<b>Phenomenon</b>	<b>Action/interaction strategy</b>	<b>Consequences</b>
<ul style="list-style-type: none"> <li>Misconceptions</li> <li>Nature of the disease</li> <li>Attitude of the patient</li> <li>Inadequate information sharing</li> </ul>	Poor management of diabetes and hypertension	<ul style="list-style-type: none"> <li>Seeking treatment from indigenous practitioners</li> <li>Neglect</li> <li>Financial drain</li> </ul>	<ul style="list-style-type: none"> <li>Complications</li> <li>Poor Quality of Life</li> <li>Poverty</li> </ul>
Non compliance			
<b>Intervening conditions</b>			
<ul style="list-style-type: none"> <li>Education of the patients</li> </ul>			

similar finding was reported by the TRIAD study. They found ignorance and carelessness toward health among the patients as difficult areas to deal.<sup>19</sup>

Most of the physicians believed that recommending diet modifications were very difficult to adapt by the patients and were ineffective in reducing CDV risk.<sup>21,22</sup> These findings corroborated findings of the present study (Table 5).

## 6. Conclusion and recommendations

Poor and distorted understanding of the disease, non-adherence to lifestyle changes and medications, indifferent attitude of the patients, chronic nature of the disease, financial constraints, and multiplicity of guidelines were identified as the major barriers in the study.

Mass awareness campaigns should be conducted in the community to dispel myths and improve knowledge. There should be honest and open communication about the role of alternate systems of medicine. The chances of poor control and related complications associated with alternate system of medicines have to be discussed with the community.

Structured physician counseling is an integral part of CVD risk reduction. Robust behavioral change strategies like goal setting and self-efficacy should be an integral part of structured counseling rather than information sharing model.

The responsibility of the physicians should also be a matter of concern. The majority of physicians attributed poor control to non-compliance to drugs by their patients; however, the fact that most of them did not follow any specific guidelines could have also contributed to this. There is a need for simple algorithms for treating hypertension and diabetes. Physicians have to be trained to build their capacity and competency. Further audit and feedback of this structured care will give additional insights to improve the outcomes. These findings suggest the need for further exploration of interventions used to eliminate barriers and foster facilitation in reducing CVD risk factors.

## Limitations of the study

Of the many CVD risk factors, only hypertension and diabetes are considered in this study. The study refers to the perceptions of doctors practicing in a rural setting of Karnataka. Studies with a larger sample size should be undertaken to generalize the results to wider population of doctors in India.

## Funding

This study was funded by Bangalore Baptist Hospital Research Fund.

## Conflicts of interest

The authors have none to declare.

## Acknowledgements

We gratefully acknowledge the contributions made by the Cardiovascular disease prevention and management program (CVD-PM) team: Sudhakar, Shivanand, Suresh, Raja, Nandish, Madhu and Krishnamurthy.

## REFERENCES

1. National Cardiovascular Disease Database. Supported by Ministry of Health & Family Welfare, Government of India and World Health Organization (Internet). Available from: [http://www.searo.who.int/india/topics/cardiovascular\\_diseases/NCD\\_Resources\\_National\\_CVD\\_database-Final\\_Report.pdf?ua=1](http://www.searo.who.int/india/topics/cardiovascular_diseases/NCD_Resources_National_CVD_database-Final_Report.pdf?ua=1); Cited 4.7.2015.
2. Gupta R, Guptha S, Sharma KK, et al. Regional variations in cardiovascular risk factors in India: India Heart Watch. *World J Cardiol*. 2012;4:112–120.
3. Cardiovascular disease in India Challenges and way ahead. International Heart Protection summit (Internet). Available from: <http://www2.deloitte.com/content/dam/Deloitte/in/Documents/life-sciences-health-care/in-lshc-cardio-noexp.pdf>; 2011 Cited 4.7.2015.
4. Norman G, George CE, Krishnamurthy A, et al. Burden of cardiovascular risk factors of a rural population in South India using the WHO multivariable risk prediction algorithm. *Int J Med Sci Public Health*. 2014;3. <http://dx.doi.org/10.5455/ijmsph.2014.180320141>.
5. Nag T, Ghosh A. Cardiovascular disease risk factors in Asian Indian population: a systematic review. *J Cardiovasc Dis Res*. 2013;4:222–228.
6. Chow CK, Teo KK, Rangarajan S, et al. Prevalence, awareness, treatment and control of hypertension in rural and urban communities in high-, middle-, and low-income countries. *JAMA*. 2013;310:959–968.
7. Gupta R. Burden of coronary heart disease in India. *Indian Heart J*. 2005;57:632–638.
8. Prevention of Cardiovascular Disease. Pocket Guidelines for Assessment and Management of Cardiovascular Risk (Internet). Available from: [http://www.who.int/cardiovascular\\_diseases/guidelines/PocketGL.ENGLISH.AFR-D-E.rev1.pdf](http://www.who.int/cardiovascular_diseases/guidelines/PocketGL.ENGLISH.AFR-D-E.rev1.pdf); 2007 Accessed 6.7.2015.
9. Stuart-Shor EM, Berra KA, Kamau MW, Kumanyika SK. Behavioral strategies for cardiovascular risk reduction in diverse and underserved racial/ethnic groups. *Circulation*. 2012;125:171–184.
10. Morse J. Approaches to qualitative-quantitative methodological triangulation. *Nurs Res*. 1991;40:120–123.
11. Patton MQ. *Qualitative Evaluation and Research Methods*. 2nd ed. Newbury Park, CA: Sage Publications; 1990.
12. Strauss A, Corbin JM. *Basics of Qualitative Research: Grounded Theory Procedures and Techniques*. 2nd ed. Newbury Park, CA: Sage Publications; 1990.
13. Farmer T, Robinson K, Elliott SJ, et al. Developing and implementing a triangulation protocol for qualitative health research. *Qual Health Res*. 2006;16:377–394.
14. Patil R, Nasrin AN, Datta SS, et al. Popular misconceptions regarding the diabetes management: where should we focus our attention? *J Clin Diagn Res*. 2013;7:287–291.
15. Rai M, Kishore J. Myths about diabetes and its treatment in North Indian population. *Int J Diabetes Dev Ctries*. 2009;29:129–132.
16. Nisar N, Khan IA, Qadri MH, et al. Myths about diabetes mellitus among non diabetic individuals attending primary

- health care centers of Karachi suburbs. *J Coll Phys Surg Pak*. 2007;17:398–401.
17. Alsunni AA, Albaker WI, Badar A. Determinants of misconceptions about diabetes among Saudi diabetic patients attending diabetes clinic at a tertiary care hospital in Eastern Saudi Arabia. *J Fam Commun Med*. 2014;21:93–99.
  18. Mahmood K, Akhtar ST, Haider I, et al. Dietary misconceptions in Pakistani diabetic patients. *Pak J Med Sci*. 2011;27:128–132.
  19. Crosson JC, Heisler M, Subramanian U, et al. Physicians' perceptions of barriers to cardiovascular disease risk factor control among patients with diabetes: results from the translating research into action for diabetes (TRIAD) study. *J Am Board Fam Med*. 2010;23:171–178.
  20. Tripp-Reimer T, Choi E, Kelley LS, et al. Cultural barriers to care: inverting the problem. *Diabetes Spectr*. 2001;14:13–22.
  21. Grant AM, Niyonsenga T, Dion I, et al. Cardiovascular disease. Physician attitudes toward prevention and treatment. *Can Fam Phys*. 1998;44:780–787.
  22. Rafique G, Furqan S. Identifying needs and barriers to diabetes education in patients with diabetes. *J Pak Med Assoc*. 2006;56:347–352.