International Journal of Nursing & Midwifery Research
Volume 5, Issue 3 - 2018, Pg. No. 32-40
Peer Reviewed & Open Access Journal

Research Article

Assessment of Adherence with Lifestyle Modification and Drug Regimen: To Develop a Mobile App

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DOI: https://doi.org/10.24321/2455.9318.201829

Abstract

Introduction: WHO (2003) estimates that only about 50% of patients with chronic diseases follow treatment recommendations. Non-adherence to lifestyle modification and medication regimen among Coronary Heart disease CHD patients post Coronary Artery Bypass Grafting (CABG) is a major area of concern. It is essential for post CABG patients to adhere with the prescribed regimen to prevent complications and to save their life. Smart phone applications have the potential to address the complexity of non-adherence behaviour regarding both medical treatments and lifestyle modification.

Objectives: The objectives of the study were to assess the level of adherence with lifestyle modifications and drug regimen, to identify factors contributing to adherence with lifestyle modifications and drug regimen among post CABG patients to establish association between adherence with lifestyle modification and drug regimen and selected socio-demographic variables i.e. age, sex, education, income and marital status and to develop and disseminate mobile application for modifying lifestyle and improving adherence to drug regimen.

Methodology: A descriptive research design included 50 post CABG patients who were attending cardiac surgery OPD during data collection period and were selected by purposive sampling technique. Data was gathered through interview schedule and was analysed using descriptive and inferential statistics using software SPSS 10.

Results: It showed that more than half of the subjects (52%) were non-adherent to lifestyle modification and only (48%) were adherent to lifestyle modification. Study also revealed that majority of subjects (80%) were adherent to drug regimen and only (20%) were non-adherent to drug regimen. Among factors contributing to adherence, knowledge about importance of adherence to diet and exercise were having most significance. Busy schedule found to be an important factor affecting adherence to exercise regimen. Motivational factors like support from family member or partner in following diet exercise and drug regimen were found very significant. There were no significant association found between selected variables i.e. age, sex, education, income, marital status of subjects and their level of adherence.

Conclusion: The study concluded that the majority of the subjects were non-adherent to lifestyle modification but majority of them are adherent to drug regimen. Among factors contributing to adherence, knowledge, time, motivation, beliefs and forgetfulness were significant. There were no significant association found between level of adherence and selected socio-demographic variables.

Keywords: Adherence, CABG, Life style modification, Mobile App., Non-adherence, Smart phone

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How to cite this article: Sehar S, Bhardawaj UD, Naseem M et al. Assessment of Adherence with Lifestyle Modification and Drug Regimen: To Develop a Mobile App. *Int J Nurs Midwif Res* 2018; 5(3): 32-40.

Introduction

Coronary artery bypass grafting (CABG) is a type of surgery that improves blood flow to the heart. It is used to treat people who have severe coronary heart disease (CHD).[1] CHD is one type of cardiovascular disease (CVD). CVD's are the number one cause of death globally. An estimated 17.7 million people died from CVDs in 2015, representing 31% of all global deaths. Of these deaths, an estimated 7.4 million were due to CHD and 6.7 million were due to stroke. Over three quarters of CVD deaths take place in low- and middle-income countries. Out of the 17 million premature deaths (under the age of 70) due to non-communicable diseases in 2015, 82% are in low- and middle-income countries, and 37% are caused by CVDs.[2] The major reason attributed for this rising number of patients include diet low in poly unsaturated fatty acids, cigarette smoking. CVD may lead patients into elective or non-elective surgeries to decrease mortality and improve quality of life. CABG has been the mainstay of treatment for revascularization in CHD patients, since 1960, in providing symptomatic relief and increasing life expectancy.[3] Each year 800,000 patients undergo CABG in the world. It reduces angina and stabilizes ventricular functions.[4] In India, approximately 60,000 CABG surgeries are performed annually.[5] CABG results in temporary improvement in symptoms and quality of life of cardiac patients.[6] To maximize and achieve full, long-term health benefits after the surgery, it is necessary for patients to make lifestyle modification and follow secondary prevention guidelines (e.g. participating in cardiac rehabilitation, taking prescribed medications, and making lifestyle modifications regarding dietary changes, smoking, and exercise).

Many terms have been used to describe medication taking behaviour such as compliance, adherence, intelligent compliance, and drug forgiveness. WHO defines adherence as the extent to which a person's behaviour - taking medication, following a diet and/or executing lifestyle changes - corresponds with agreed recommendations from a health care provider.[7] Adherence is an essential component in the success of preventive and the therapeutic efforts along with the efficacy of the suggested course of action. It is an active, internal and responsible process whereby patients assume responsibility aim to maintain their health in collaboration with health care staff. Adherence to lifestyle interventions and prescribed drugs is the most important factor to prevent secondary cardiac events and leads to improved satisfaction and quality of life.[8]

Medication non-adherence is a complex problem, especially for people with chronic diseases resulting in significant morbidity and mortality.[9] In general, adherence among patients with chronic conditions is very low and it declines significantly after the first six months of therapy.[10]

Non-adherence to lifestyle change and prescribed medication may worsen the disease[11] and can prohibit attaining treatment goals sufficiently. As a result of non-adherence patients do not get an appropriate benefit from medical treatment. Non-adherence may result in poor health outcome, weaken quality of life and increase health care cost.[12]

Several factors have been shown to influence non-adherence. These include living alone, poor patient-physician relationship, lack of knowledge regarding the importance of adherence, busy schedules, beliefs regarding exercise and medication and psychological factors such as anxiety and depression.[13, 14] Multiple daily dosing, excessive costs, forgetfulness, and fear of side effects have been reported to be the most important factors leading to noncompliance to medication.[15, 16]

Lifestyle modification involves altering long-term habits, typically of eating or physical activity, and maintaining the new behaviour for months or years. A lifestyle modification after CABG helps the patient to be better equipped to avoid future risk to their health. Controlling common modifiable risk factors namely physical inactivity, unhealthy diet, harmful effects of tobacco and alcohol and other habit-forming substances can help in preventing further complications.

Nowadays, the widespread adoption and use of mobile technologies is opening new and innovative ways to improve health and health care delivery. Smart phone applications (apps) have the potential to address the complexity of non-adherence behaviours regarding both medical treatment and lifestyle modifications. Applications are software programs that have been developed to run on a computer or mobile device to accomplish a specific purpose.[17]

The use of mobile communication tools has also allowed for greater patient awareness which means lots of individuals are focused on improving their health and wellbeing such as following a recommended diet, following exercise routines, and adhering to their drug regimen along with follow-up appointments. Mobile applications (apps) can help people manage their own health and wellness, promote healthy living, and gain access to useful information when and where they need it. These tools are being adopted almost as quickly as they can be developed. According to industry estimates, 500 million smart phone users worldwide were using health care application by 2015, and by 2018, 50 percent of the more than 3.4 billion smart phone and tablet users will have downloaded mobile health applications These users include health care professionals, consumers, and patients.[18]

Many studies have reported the prevalence of non-compliance among CHD patients after CABG, with respect to lifestyle modification and pharmacological treatment all over the world. However, there is lack of data with regards

ISSN: 2455-9318
DOI: https://doi.org/10.24321/2455.9318.201829

to non-adherence after coronary revascularization (post CABG) in India. Studies conducted by nurses are very less in this area of concern.

Comprehensive cardiac rehabilitation has still not caught up in India. Informed patients are in a position to make healthy life style choices post CABG. However, for this; measures need to be taken, to disseminate adequate and appropriate information and education. With this knowledge in the backdrop, it was thought that a mobile app may be useful for patients in adherence with lifestyle modification and drug regimen after a systematic assessment of these measures.

Materials and Methods

The present study has used Quantitative Research Approach. The Research Design used for the study is Descriptive Research Design. The study was conducted in the outpatient department of Cardiac surgery of Safdarjung hospital, New Delhi. The target population was all patients who had undergone CABG. Accessible population was CABG patients who had attended cardiac surgery OPD of Safdarjung Hospital. Sample was 50 post CABG patients who had completed 1-12 months and were attending cardiac surgery OPD. Purposive sampling technique was used for selecting subjects. The present study has used demographic profile and semi structured interview schedule to assess the adherence to lifestyle modification and drug regimen and factors contributing to adherence. Content validity of the tool was done by 11 experts from the field of nursing, physiotherapy and cardiac surgery. After obtaining content validity, it was tried out on 5 post CABG patients to check clarity of the tool. It was found to be comprehensible and clear. Reliability of the tool was calculated by Cronbach's Alpha. The alpha coefficient is 7.39. Hence, the tool found reliable. After the formal permission from the concerned authority, final study was conducted at Safdarjung Hospital; New Delhi from 16 October 17 to 6 November 17. A sample of 50 post CABG patients was selected who met the inclusion criteria.

Statistical Analysis

The data was analysed using descriptive and inferential statistics using software SPSS 10. After analysis of the study finding a mobile app was developed to improve lifestyle and medication adherence. Final version of mobile app "Happy Heart" was developed based on the Android Operating System (AOS). The mobile app is available @https://play.google.com/store/apps/details?id=com.consultancy.adsam.happyheart.happyheart.

Results

Description of Demographic Profiles of the Post CABG Patients

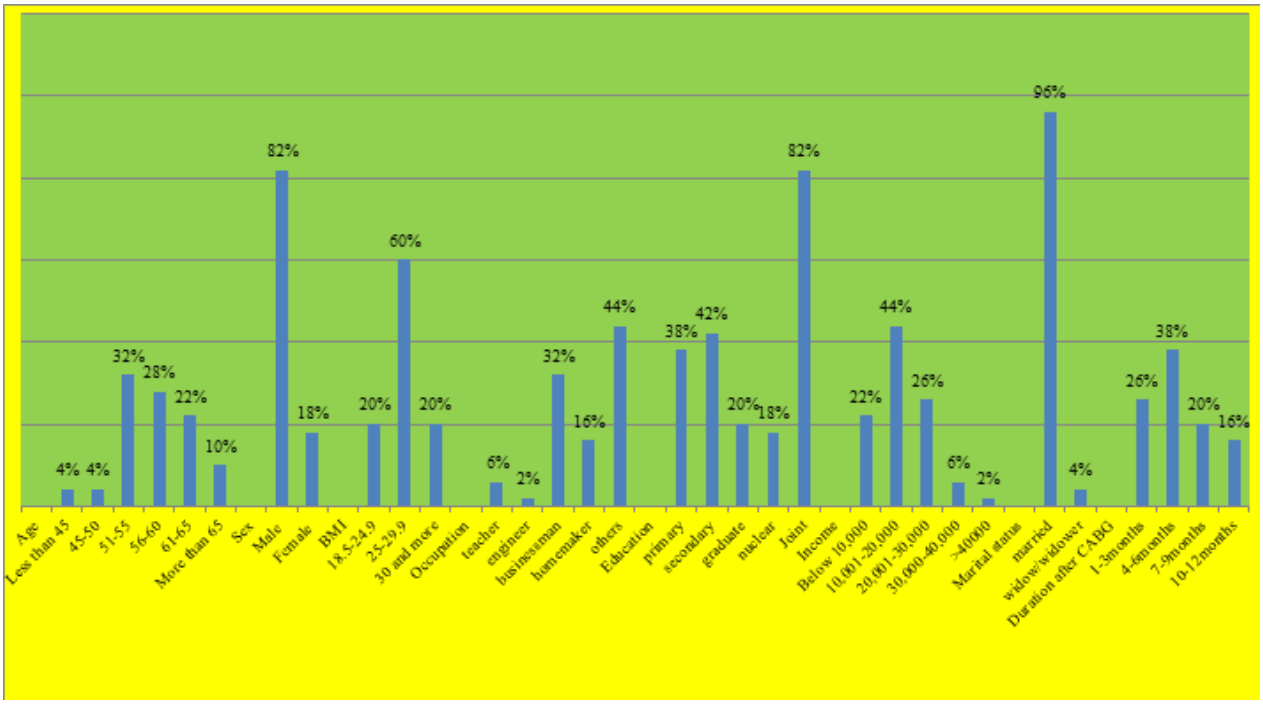


Figure 1.Bar diagram showing percentage distribution of the demographic variables (age, sex, BMI, occupation, education, type of family, income, marital status, duration after CABG) among study subjects

The data in Figure 1 describes the demographic profiles of 50 post CABG patients.

ISSN: 2455-9318
DOI: https://doi.org/10.24321/2455.9318.201829

Regarding the age of the post CABG patients data revealed that out of 50 patients majority (32%) of them were in age group 51-55 years. Majority (82%) of them were male and only 18% were female. Data shows that more than half (60%) were having BMI in between 25-29.9. Data revealed (6%) of the study subjects were teacher, 2% were engineer, 32% were businessman, 16% were homemaker, others (44%) belonged to other occupation. Regarding the educational qualification of study subject majority (42%) had secondary education. Data shows that majority of subjects (82%) belongs to joint family. Data reveals that 44% of the subjects were having income in between 10,001 - 20,000. Most (96%) of the subject were married. Regarding duration of CABG surgery 26% of the subjects had completed 1 months - 3 months, 38% had completed 4 months - 6 months, 20% had completed 7 months - 9 months, 16% had completed 10 months - 12 months.

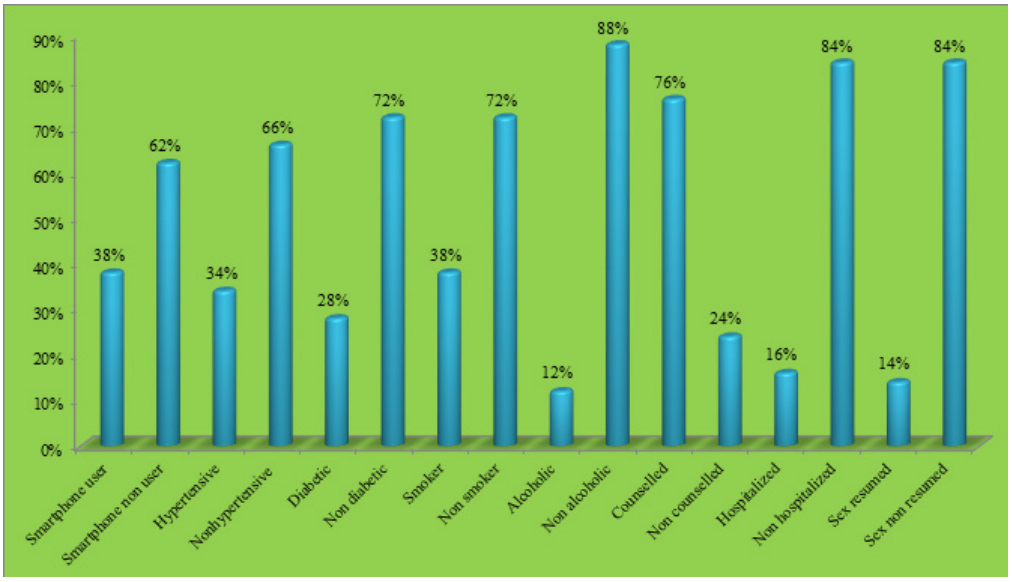


Figure 2.Bar diagram showing percentage distribution of the study subjects with respect to smart phone users, history of hypertension, history of diabetes mellitus, history of smoking, history of alcohol, discharge counselling by health care workers, history of hospitalization post CABG, resuming of sexual activity post CABG

The data in Figure 2 describes the demographic variables of 50 post CABG patients.

It reveals that majority of subjects 62% were not using smart phones while 38% were using smart phone. Majority of subjects (66%) were not having history of hypertension, 17 (34%) of subjects were reported to be hypertensive. Regarding Diabetes mellitus majority of the subjects 72% were not having diabetes while 28% were having diabetes. Study has found that majority 62% of subjects were non smoker. Majority (88%) of subjects were not consuming alcohol. Majority of subjects (76%) reported that they had received discharge counselling by healthcare workers while 12 (24%) had not received. Most of the subjects (84%) were not having history of hospitalization after CABG while 8 (16%) were hospitalized after CABG. Majority of subjects 43 (86%) reported that they had not resumed sex, 7 (14%) had resumed sex.

Findings Related to the Assessment of Level of Adherence to Lifestyle Modifications and Drug Regimen among Post CABG Patients

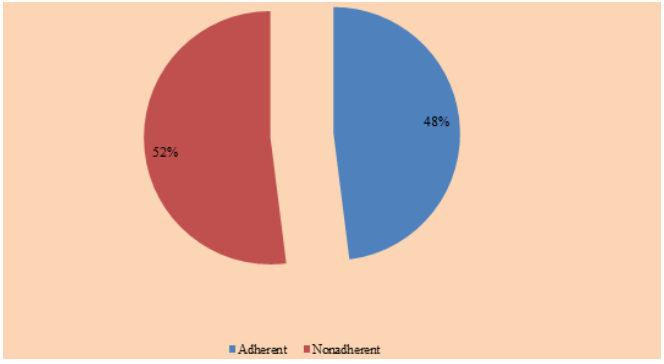


Figure 3.Frequency and percentage distribution of the level of adherence to lifestyle modification among post CABG patients

ISSN: 2455-9318
DOI: https://doi.org/10.24321/2455.9318.201829

Data in Figure 3 reveals that more than half of subjects (52%) were non-adherent to lifestyle modification and only 48% were adherent to lifestyle modification.

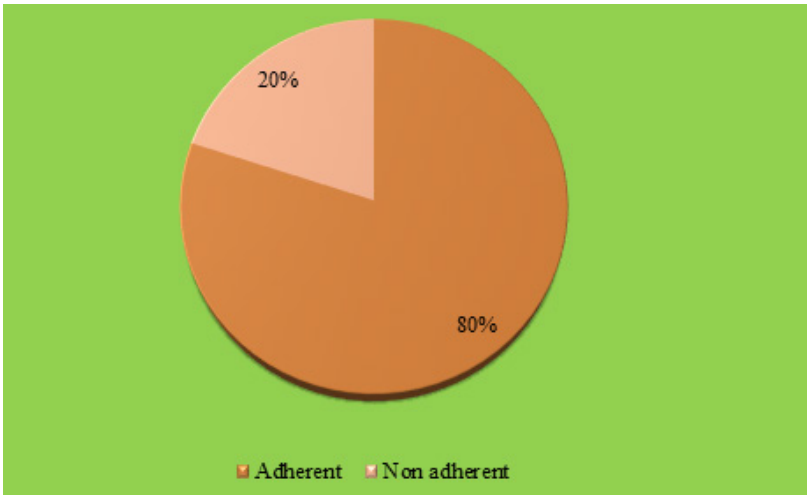


Figure 4.Frequency and percentage distribution of the level of adherence to drug regimen among post CABG patients

Data in Figure 4 reveals that majority of subjects 80% were adherent to drug regimen and only 20% were non-adherent to drug regimen.

Findings Related to the Assessment of Factors Contributing to Adherence among Post CABG Patients in the Selected Hospital of New Delhi

The data presented in Table 1 represents the factors contributing to the adherence as reported by them. Regarding the factors contributing to adherence, knowledge factor was ranked I, time factor was ranked II, motivational factors were ranked III, belief factors were ranked IV, forgetfulness was ranked V, fear factors were ranked VI, cost factor was ranked VII, psychological factors and physiological factor had similar rank VIII.

Table 1.Area wise mean of obtained score of factors influencing the adherence among post CABG patients in selected hospital of New Delhi

(n=50)

S. No.	Factors	Mean	Number of items	Modified mean	Rank order
1	Motivational factors	4.26	6	0.71	III
2	Belief factors	1.88	3	0.62	IV
3	Knowledge factors	1.48	2	0.74	I
4	Time factor	0.72	1	0.72	II
5	Psychological factors	1.50	3	0.50	VIII
6	Forgetfulness	.58	1	0.58	V
7	Fear factors	2.24	4	0.56	VI
8	Physiological factor	.50	1	0.50	VIII
9	Cost factor	.52	1	0.52	VII

Findings Related to Establish Association between Adherence with Lifestyle Modifications and Drug Regimen and Selected Socio-Demographic Variables i.e. Age, Sex, Education, Income, Marital Status of Post CABG Patients

Data represented in Table 2 reveals Fisher's Exact test values to find out the association between adherence with lifestyle modifications and drug regimen and selected demographic variables sex, age, education income and marital status. Statistically there were no significant association found.

ISSN: 2455-9318
DOI: https://doi.org/10.24321/2455.9318.201829

Table 2.Findings related to the association of level of adherence to lifestyle modification and drug regimen with their age, sex, education, income and marital status

(n=50)

S. No.	Category	Adherent	Non adherent	Test applied	p value	Significance
1	**Sex**					
	Male	22	19	Fisher' s Exact	0.616	Non-significant
	Female	4	5			
2	**Age in years**					
	less than 45	1	1			
	45-50	0	2			
	51-55	9	7	Fisher' s Exact	0.500	Non-significant
	56-60	6	8			
	61-65	6	5			
	More than 65	4	1			
3	**Education**					
	Primary	10	9	Fisher' s Exact	0.669	Non-significant
	Secondary	12	9			
	Graduate	4	6			
4	**Income in INR**					
	Below 10,000	5	6			
	10, 001-20,000	10	12	Fisher' s Exact	0.370	Non-significant
	20, 001-30,000	7	6			
	30, 001-40,000	3	0			
	>40,000	1	0			
5	**Marital status**					Non-significant
	Married	26	22	Fisher' s Exact	0.133	
	Widow/widower	0	2			

Non-significant at p>0.05 level of significance.

Discussion

This study was aimed to estimate prevalence of adherence to lifestyle modifications such as dietary changes, exercising, smoking and alcohol cessation, follow up and resuming of sexual activity as well as to drug regimen. This study reveals that adherence to drug regimen is good but non-adherence to lifestyle modification after CABG is high. This is a major obstacle in achieving better long-term clinical outcomes among coronary heart disease patients post CABG. This increases burden of disease on healthcare system and also increases health care expenses on individual and country. There have been several studies that have analysed the frequency of adherence and non-adherence and explored the root causes of this situation. Several factors play a role in the non-adherence to lifestyle modifications. A lifestyle modification after CABG equips the patient to avoid future risk to their health so it is extremely important to explain the patient the importance of lifestyle modification.

A study done by Ali M et al. in Karachi on Frequency and predictors of non-adherence to lifestyle modifications and medications after coronary artery bypass grafting shows that roughly half of the patients were non-adherent to dietary recommendations (n = 120, 45.3%) and exercise (n = 109, 41.1%) while about one third (n = 69, 26%) were non-adherent to prescribed medications.[19] Similar findings were revealed in the present study. Among 50 post CABG patients more than half of the subjects (52%) were non-adherent to lifestyle modification and around 20% of the subjects were non-adherent to drug regimen.

The present studies found that majority of subjects were not having history of smoking. These findings are inconsistent with Harrington MC, whose study revealed that the majority of CAD patients were smokers.[20]

The present study is not congregant with the study by Leila R., which shows that the majority of patients had appropriate adherence to smoke cessation, physical activity and medication, but had inappropriate adherence to diet.[21]

Ali M et al., found that reluctance to follow exercise regimen, busy schedule, and fear that exercise will aggravate heart issues were commonly reported as reasons for non-compliance to exercise. As for non-adherence to medication, forgetfulness, affordability of drugs and too many medications to take were important predictors.[19] The present study has also suggested that knowledge; time, motivational factors such as finding it difficult to follow exercise regimen and beliefs are important factor which

ISSN: 2455-9318
DOI: https://doi.org/10.24321/2455.9318.201829

affects adherence to exercise. Common factors affecting adherence to medications were forgetfulness and beliefs.

Conclusion

The finding of the study indicates that the majority of subjects were non-adherent to lifestyle modifications but majority of them are adherent to drug regimen. Among factors contributing to adherence, knowledge, time, motivation, beliefs and forgetfulness were significant. There were no significant association found between level of adherence and selected socio-demographic variables.

Acknowledgements

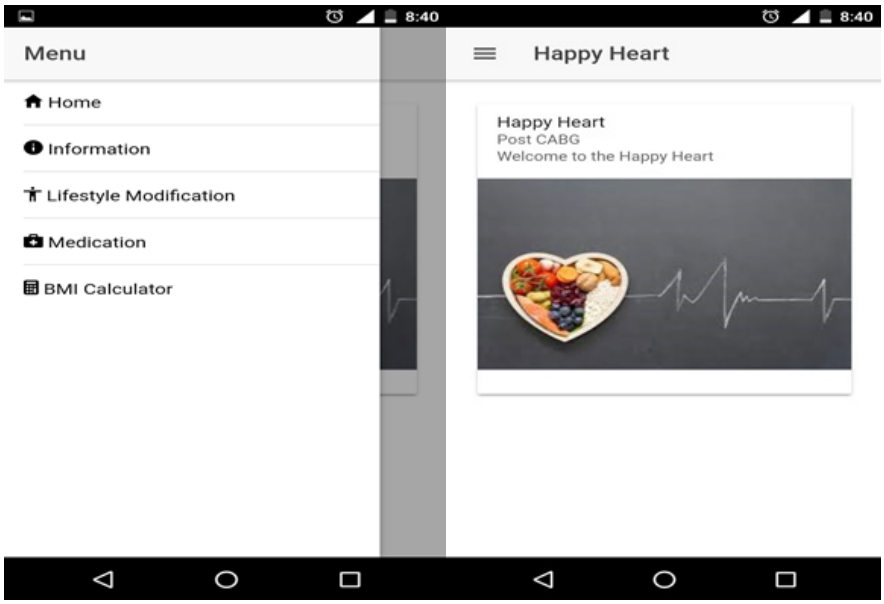
I express my sincerest gratitude to my guide Professor Urmila D. Bhardawaj, Professor Rufaida college of Nursing Jamia Hamdard for the constant encouragement, valuable suggestions, and guidance throughout the study. I am also thankful to my co guides Mr. Naseem M, Dr. Manju Gupta for their continuous support and guidance. I am really thankful to our principal Prof. (Dr.) Manju Chhugani for providing required facilities and support.

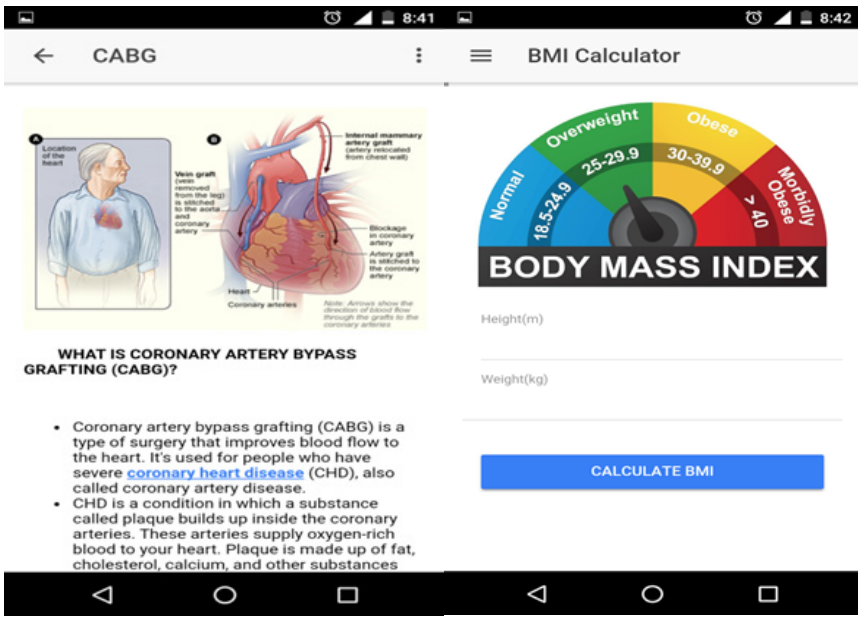
About Mobile Application

Based on the findings of the study a mobile app named Happy Heart was developed to improve lifestyle and adherence. Mobile app has following modules:

- Information
- Reminder
- E-Diary
- Alert
- Feedback
- Bmi Calculator

Some Screenshots of mobile App "HAPPY HEART"





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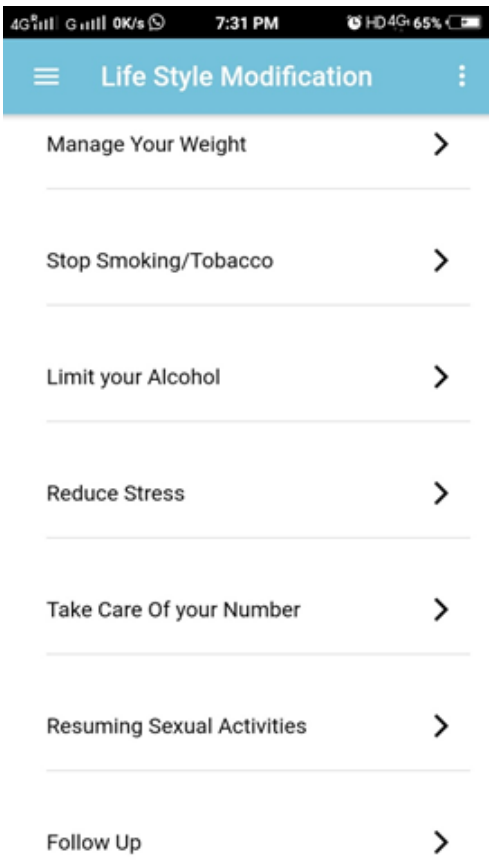

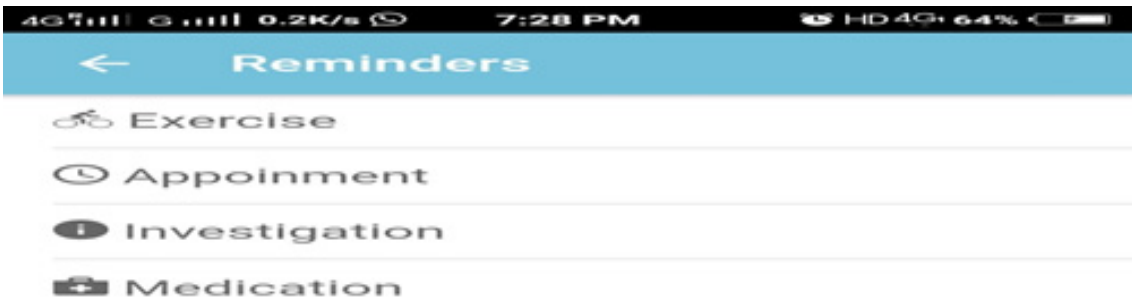

Conflict of Interest: None

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ISSN: 2455-9318
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Date of Submission: 2018-06-01
Date of Acceptance: 2018-10-08