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ORIGINAL

EVALUATING THE COMPREHENSIVE IMPACT OF NURSING BEHAVIOR CHANGE THEORIES BASED ON EXERCISE INTERVENTIONS ON LIFESTYLE AND QUALITY OF LIFE IN PATIENTS POST-CORONARY INTERVENTION

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ABSTRACT

Coronary artery disease (CAD) poses a significant health risk to the global population and behavioural change theory intervention on lifestyle and physical activities are needed to improve patient's quality of life. Our main objective is to examine the application of behaviour change intervention program on the on the lifestyle and quality of life of patients after coronary intervention. The randomised controlled trial was carried at Fuawi Hospital consisting of 156 participants divided into control and intervention groups. The primary outcomes showed significant changes and increase in levels of physical activity between intervention and controls with the intervention group showing higher frequency, duration and intensity in both moderate physical activity and walking. Secondary outcomes showed significant reductions in the blood pressure, BMI, and improved healthcare-related quality of life. Alsos, significant lifestyle changes were observed with cessation of smoking, increased intake of healthy diets, stress and sleep management. Thus, the behavioural intervention change program was significant in improving the outcomes of CAD patients through increased levels of physical activity, increased quality of life and lifestyle changes.

KEYWORDS: CAD; Behavioural Intervention; Quality of Life; Physical Activity; and Lifestyle

1. INTRODUCTION

Coronary artery disease (CAD) is a life-threatening disease that single-handedly causes mortality and loss of disability-adjusted life years, especially in low and middle-income nations (Ralapanawa & Sivakanesan, 2021). Stent replacement or angioplasty are the characteristic intervention procedures for the disease as they improve cardiac performance, quality of life, and long-term lifestyle modifications among patients. Despite the elaborate interventions, many patients face difficulties adopting healthier behaviours and experience low quality of life. CAD's many pathological indicators, including coronary stenosis, can be captured by CT angiography. According to Ahmad et al. percutaneous coronary intervention (PCI) refers to a non-surgical and invasive procedure that is used to remove the occlusion and narrowing of the coronary artery (Ahmad, Mehta, Reddivari, & Mungee, 2023). Its main objective is to increase the supply of blood to ischemic tissues and can be realized through deploying stents or ballooning the narrow segments. Rehabilitation interventions and programs are usually delivered across various surgical interventions to improve the outcomes of health risk behaviours and lower the length of hospital stay. In each year, more than 310 million surgical operations are performed in the world (Dobson, 2020).

The constant increase in the number of surgical operations poses a critical metabolic stress on patients (Helander et al., 2019) coupled with an increase in the rates of complications to about 20% after surgical operations (Stevens, Feelisch, & Martin, 2019). The conventional rehabilitation of CAD patients was primarily focused on the physical capacities, physical exercise and were predominantly conducted in men. Previous studies (De Backer et al., 2003) have postulated that stress reduction programs can be tailored and implemented to reduce mortality rates of individuals with congenital heart defects (CHD). Increasing the physical capacity of individuals is a fundamental basis for men and women to realise positive outcomes after coronary intervention despite the difficulties and challenges experienced by patients. The constant daily life stresses and strains creates a complex and difficult situation for patients that could extend beyond physical fitness into anxiety, depression or other adverse outcomes. Therefore, behavioural interventions have been proposed and developed to mitigate these issues and help patients overcome everyday life challenges.

The analysis and identification of specific active ingredients that distinguish between effective approaches geared towards increased physical activity and decreased sedentary behaviour is important in improving the outcomes of treatment. Behaviour change techniques allows for comparisons and replication of successful components such as the Behaviour change technique taxonomy (vi) that uses a defined system in prescribing standard

components of physical activity (Michie et al., 2013). Previous analyses investigating the role of every behaviour change therapy on sedentary lifestyle or levels of physical activities have reported variations in effectiveness (Michie, Abraham, Whittington, McAteer, & Gupta, 2009; Michie, Van Stralen, & West, 2011). Michie et al. (2009) found that behaviour change interventions used in increasing physical activity and healthy eating were highly effective when combined with self-monitoring of one or more behaviour change techniques extracted from the controls of setting goals, feedback on behaviours and review of behavioural goals. The major role of behavioural change techniques is not yet fully examined in individuals with CAD based on levels of physical activity and sedentary lifestyle (Cambruzzi et al., 2015).

Early intervention reduces the possibility of lifelong conditions such as CHD and helps patients avoid cardiac risk factors consisting of smoking, hypertension, obesity or diabetes (Maruthur, Wang, & Appel, 2009; Rippe & Angelopoulos, 2019). Behavioural intervention lowers these risks because it permits modification of lifestyles, increasing levels of physical activity, nutrition management and effective stress management (Chaix et al., 2016; Spring, Champion, Acabchuk, & Hennessy, 2021). Positive healthy behavioural changes is an important factor of lifestyle intervention programmes that serves to lower these risk factors. In the recent studies, there are no psychological models that have explained the link between physical activity and dietary behaviours in CAD. Although, health behavioural theories such as Health Belief Model (Toft et al., 2007), Theory of Planned Behaviour (Ajzen, 1985; Bandura, 1977) and COM-B Behaviour Change Model (Michie et al., 2011) have been proposed as key predictors of behavioural change based on lifestyle, motivation, awareness and self-efficacy.

Behavioural change interventions have shown higher efficacy in boosting the levels of physical activity among CAD and CHD patients with notable outcomes in improved psychosocial health (Blanchard et al., 2010; Franssen, Franssen, Spaas, Solmi, & Eijnde, 2020; Rodrigues, João, Gallani, Cornélio, & Alexandre, 2013). Behavioural change interventions involve strategies such as setting of goals, feedback on behaviour and self-monitoring of behavioural patterns. Previous studies have found that setting of goals is highly effective when short-term goals are used (Locke & Latham, 2019), they are more specific (Bierbauer et al., 2023; Graham, Prue-Owens, Kirby, & Ramesh, 2020) and these goals are set by the patients in conjunction with qualified medical health professionals (Schroé et al., 2020).

Self-monitoring of behavioural change interventions was reported to use diaries and records as a constant reminder and increased awareness of the existing behavioural model to be followed by the patient (Krist et al., 2020; Rippe & Angelopoulos, 2019) alongside increasing levels of physical activity

(Nakanishi et al., 2022). Additionally, it has been reported that consistent follow-ups and regular consultations with medical health professionals increases the patient's capacity of self-monitoring and motivation to realise the set goals.

1.1 Research Objective

The main objective of our study is to examine the application of behaviour change theory based on exercise intervention in preoperative assessment and rehabilitation management. Also, we seek to examine the efficacy of behavioural change interventions in increasing the levels of physical activity and quality of life by improving the confidence for exercising, tailored setting of goals and feedback.

2. Methods

2.1 Study Design

Our single centre randomised controlled trial was conducted at the the Fuawi Hospital and performed according to the consolidated standards of reporting trials (Schulz, Altman, & Moher, 2010). Ethical approval was granted by the the Fuawi Hospital ethical committee and institutional review board.

2.2 Participants and Eligibility Criteria

Our study consisted of CAD patients who met the following inclusion and exclusion criteria; participants who were clinically capable of performing physical activities; participants who were aged 18 to 70 years, participants who did not have major health issues or co-morbidities and participants who had access to either a computer or telephone. Our sample size estimations showed that 156 individuals were required to ensure that even if 15% were lost during follow-up, we still had a sufficient number for statistical analysis based on estimates from previous papers (Furber, Butler, Phongsavan, Mark, & Bauman, 2010; Luszczynska, 2006).

2.3 Procedure

Participants were recruited from the medical records which were screened by physicians and qualified medical professionals. After eligible participants were obtained, the participants were issued with information sheets containing details about the study before completing consent forms before undertaking the study commencing with collection of the baseline data. All participants were then randomly divided using a random number generator into control and experimental groups.

The control group received standard care from the physicians consisting of general advice on the importance of physical activity, exercising and how to

perform moderate to intense physical activities (consisting of brisk walking, light running or jogging). The experimental group received the standard care and a detailed 180 days' behavioural intervention program under the guidance of a cardiac nurse with experience inf lifestyle and behavioural intervention programs for cardiovascular diseases.

2.4 Behavioural Intervention Change Program

A physical activity (PA) intervention was conducted from April to October 2023. It aimed to increase participants' PA levels to meet recommended daily guidelines (moderate PA for at least 20 minutes on most days). The intervention employed goal-setting, self-monitoring, and feedback to achieve behaviour change. During initial in-person consultation (10-30 minutes), a cardiac nurse used motivational interviewing to address participant barriers, identify facilitators for an active lifestyle, boost self-efficacy for PA, and collaboratively set individualized, short-term goals.

Self-monitoring was encouraged through regular PA recording in a diary. Ten follow-up phone consultations (10-20 minutes each, monthly) provided tailored feedback, reviewed goals and progress, and addressed emerging barriers. The frequency and duration of consultations aligned with evidence-based practices. Mobile phone text messages (10 total, delivered bi-weekly for 3 months, then weekly for 3 months) served as prompts and reminders, based on the Theory of Planned Behaviour (TPB) to target attitudes, social norms, perceived control, and intention (Ajzen, 1991; Bandura, 2004).

2.5 Outcomes and Measures

Outcomes were assessed at baseline (recruitment) and post-intervention (6 months). Data collection included questionnaires, physiological measures, and body composition (all at baseline and post-intervention), with an additional follow-up questionnaire (3 months after intervention) on intervention perception, current PA engagement, and PA intentions. Standard questionnaire measures consisted of physical activity, health related quality of life and an individual's self-efficacy for undertaking exercises. Additionally, demographic measures on age, gender, marital status, income and living status were obtained. The physiological and composition of the body were measured using height, weight and blood pressure. The levels of physical activity were self-reported through the short version of the International Physical Activity Questionnaire [IPAQ] which has a higher reliability, validity and internal consistency (Helmerhorst, Brage, Warren, Besson, & Ekelund, 2012).

The questionnaire consisted of measurements based on leisure time, gardening and domestic activities, work and transport. Specific physical activities involved walking, moderate intensity and vigorous intensity. The self-

efficacy for exercising was measured using the Exercise Self-Efficacy Scale (ESES, (Resnick & Jenkins, 2000), consisting of nine items that analysed situations involving individuals who experience difficulties when exercising. The responses were rated based on the perceived ability to undertake moderate physical activity from 0 (not confident) to 10 (very confident). The total scores were the sum of each answer divided by the number of answers. Health-related quality of life (HRQL) was assessed using the Mac-New Heart Disease HRQL (Valenti, Lim, Heller, & Knapp, 1996) consisting of 27 items that examines the aspects of quality of life based on physical, social and emotional functioning effects of CAD. Items were measured on a Likert scale from 1 (Low HRQL) and 7 (High HRQL).

The diastolic and systolic blood pressure was measured using an automated electronic blood pressure monitor for all patients at baseline and 180 days. The body mass index (BMI) was estimated from the height and weight measurements and participants were classified based on BMI (BMI < 18.5 = Underweight; BMI = 18.5-25 = Normal Weight; BMI = 25-30 = Overweight; and BMI >30 = Obese).

2.6 Statistical Analysis

The statistical power used was determined from the differences in the average changes in the amount of physical activity (minutes per week) between experimental and control groups. Improvements in physical activity were quantified based on 30 mins per week and was clinically relevant and widely adopted. The standard deviation on the sample size was reported at 60 with significance level of 5% and statistical power of 80%. The readings of blood pressure were measured with a standard deviation of 5 mmHg for about 75% of all readings. All the collected data were analysed in GraphPad Prism version 9.5.1.

An independent samples t-test and Chi-square test was conducted to estimate the baseline to 180 days of changes of physical activity, demographic variables and secondary outcomes between control and experimental groups. Missing data were analysed based on complete case analyses because they were believed to have been missing completely at random (MCAR) while the intention to treat analyses were incorporated based on several imputations and carrying forward of the last observations.

3. Results

3.1 Analysis of Primary Outcomes

The study consisted of 156 participants divided into control (n=75) and intervention (n=86) groups (see Table 1).

Table 1: Analysis of Differences in the Sociodemographic profile of participants in the Control and Experimental Groups.

CHARACTERISTICS	CONTROL (N=75)	INTERVENTION (N=86)	P-VALUE
AGE	56 ± 6.7 years	55.8 ± 10.1 years	0.67
MALE	38 (50.7%)	50 (58.1%)	0.76
CURRENT CHD			
CHEST PAIN	14 (18.7%)	9 (10.5%)	0.25
CATHETERIZATION	52 (69.3%)	65 (75.6%)	
CARDIAC SURGERY	9 (12.0%)	8 (9.3%)	
MYOCARDIAL INFARCTION	0 (0.0%)	2 (2.3%)	
DURATION OF DIAGNOSIS	61.5 ± 60.8 months	48.3 ± 45.3 months	
CHRONIC DISEASE			0.31
DIABETES	5 (6.7%)	10 (11.6%)	
HYPERTENSION	29 (38.7%)	27 (31.4%)	
DIABETES & HYPERTENSION	25 (33.3%)	28 (32.6%)	
NONE	16 (21.3%)	21 (24.4%)	

Note: *Parenthesis represented percentages (%) and the values are represented as Mean ±Standard deviation.*

In Table 1, The study included 75 control participants and 86 intervention participants with an average age of 56 and 55.8 years, respectively. Among participants, 50.7% of the control group and 58.1% of the intervention group were male. In the control group, 18.7% reported chest pain, 69.3% had a history of catheterization, and 12.0% had undergone cardiac surgery.

The intervention group had a slightly lower prevalence of chest pain (10.5%) but a similar proportion with a history of catheterization (75.6%) and cardiac surgery (9.3%). No participants in the control group had a myocardial infarction, while 2.3% of the intervention group did. The average duration of diagnosis was 61.5 months for the control group and 48.3 months for the intervention group.

Regarding chronic diseases, 6.7% of the control group had diabetes compared to 11.6% of the intervention group. Hypertension was present in 38.7 percent of the control group and 31.4% of the intervention group. There was a similar prevalence of both diabetes and hypertension (around 33%) and those with none of these chronic diseases (around 21-24%) between the two groups (see Figure 1).

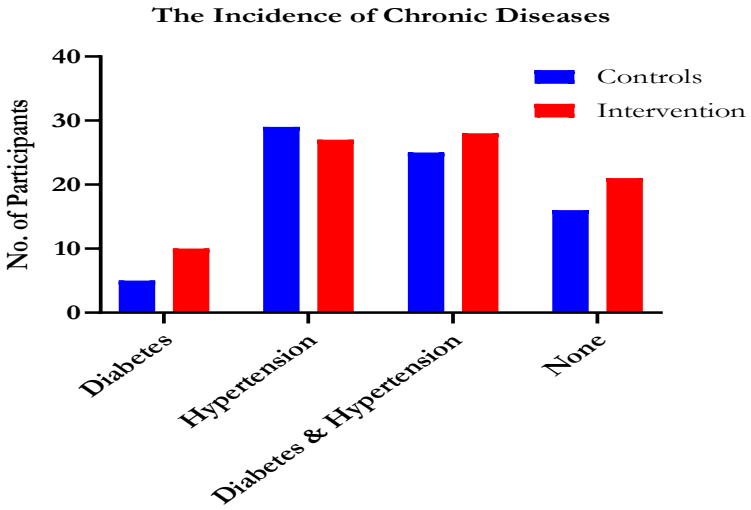

Figure 1: The Distribution of Chronic Diseases Between Controls and Intervention Groups.

Table 2: Analysis of changes in physical activity levels between Intervention and Controls

PA LEVELS	CONTROL (N = 70)		INTERVENTION (N = 81)		MD (95 % CI)
	Baseline M(SD)	180 Days M(SD)	Baseline M (SD)	180 Days M(SD)	
MODERATE PA FREQUENCY	0.65 (0.41)	0.79 (0.57)	0.60 (0.46)	0.83 (0.68)	−0.25* (−0.71 to −0.10)
DURATION	21.13 (60.50)	23.46 (68.73)	23.14 (46.85)	26.67 (99.76)	−20.50* (−29.98 to −2.58)
MODERATE PA & WALKING					
FREQUENCY	4.03 (3.50)	4.40 (2.46)	4.4 (2.67)	8.15 (2.26)	−3.78* (−4.57 to −2.00)
DURATION	85.81 (93.88)	107.86 (198.02)	88.93 (100.11)	244.9 (121.10)	−146.86* (−199.96 to −63.76)
INTENSITY	285.26 (310.71)	298.78 (312.64)	287.52 (311.43)	771.64 (396.44)	−580.61* (−697.61 to 393.61)

Note: *PA = Physical Activity measured on the days per week. M (SD) = Mean (Standard Deviation). CI = Confidence Interval. Duration = Minutes per week. Intensity = Metabolic Equivalents minutes per Week.*

In Table 2, at baseline, the average frequency of moderate PA was similar between groups (control: 0.65, intervention: 0.60), but the intervention group showed a larger increase at 6 months (control: 0.79, intervention: 0.83). Likewise, average baseline duration of moderate PA was comparable (control: 21.13 minutes, intervention: 23.14 minutes), with a slightly greater increase in the intervention group at 6 months (control: 20.46 minutes, intervention: 26.67 minutes). Similar trends were observed for moderate PA and walking frequency/duration, with the intervention group showing greater increases over time (see Figures 2 and 3).

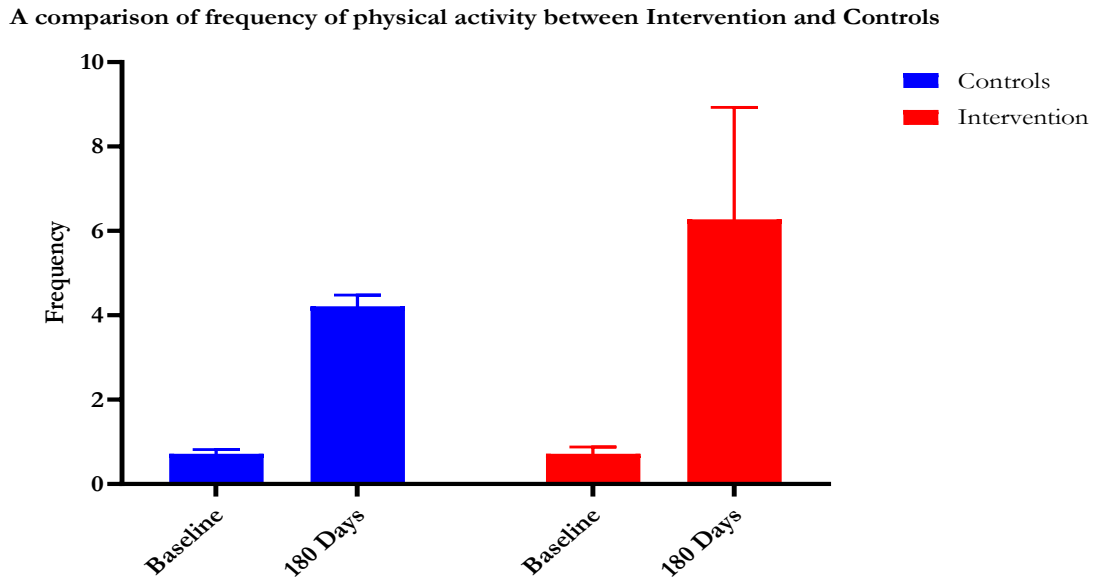

Figure 2: A comparison of the Frequency of physical activity (moderate physical activity and walking) between Intervention and Controls.

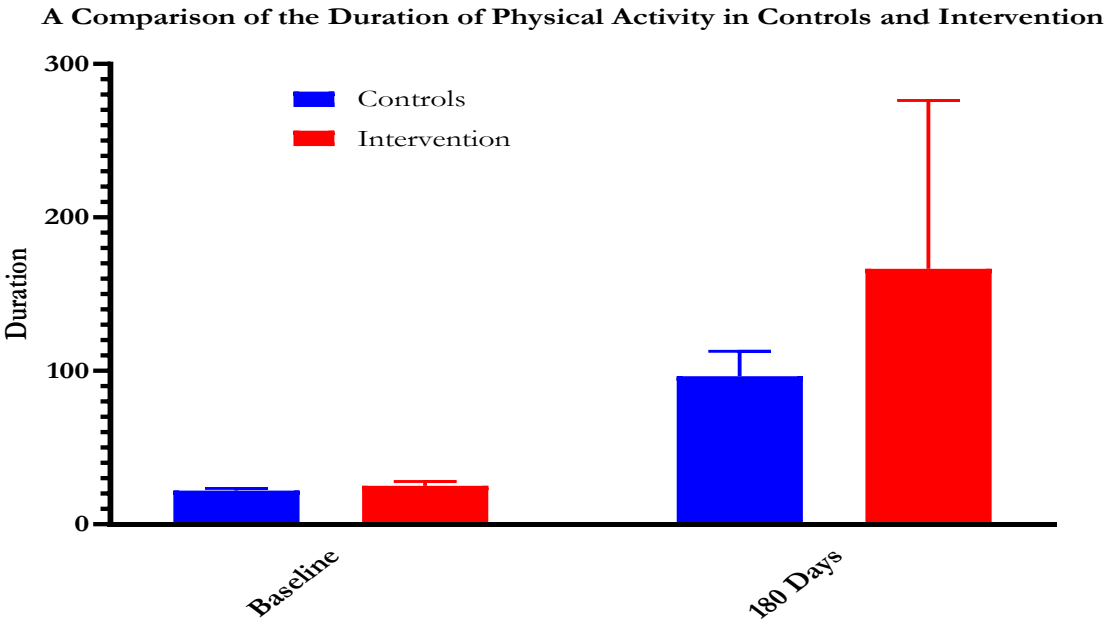

Figure 3: A comparison of the Duration of physical activity (moderate physical activity and walking) between Intervention and Controls.

3.2 Analysis of Secondary Outcomes

In Table 3, at baseline, the mean HRQoL score in the control group was 4.85 (SD=2.05) and in the intervention group was 4.41 (SD=0.93). After 6 months, the mean HRQoL score increased in both groups, with a larger increase observed in the intervention group (6.33, SD=1.70) compared to the control group (5.00, SD=1.10). The mean difference in HRQoL score between the two groups at 6 months was -1.24 (95%CI: -1.45 to -1.03), indicating a significantly greater improvement in HRQoL in the intervention group.

Table 3: Analysis of Health-related quality of Life (HRQL).

QOL	CONTROL (N = 70)		INTERVENTION (N = 81)		MEAN (95%CI)	DIFFERENCE
	Baseline M (SD)	6 months M (SD)	Baseline M (SD)	6 months M (SD)		
HRQL (1–7)	4.85 (2.05)	5.0 (1.1)	4.41 (0.93)	6.33 (1.70)	−1.24* (−1.45 to −1.03)	

Note: *QoL = Quality of Life. M (SD) = Mean (Standard Deviation). CI = Confidence Interval.*

In Table 4, Systolic blood pressure (SBP) increased slightly in both groups, with a larger increase in the control group (135.8 to 140.4 mmHg) compared to the intervention group (133.9 to 129.8 mmHg). A similar trend was observed for diastolic blood pressure (DBP) (see Figure 4). Both groups experienced weight loss, with a greater average decrease in the intervention group (84.5 to 77.8 kg) compared to the control group (84.5 to 84.7 kg). This difference was reflected in body mass index (BMI), where the intervention group showed a larger decrease (28.3 to 27.6 kg/m2) compared to the control group (31.6 to 33.8 kg/m2).

Table 4: Analysis of physiological outcomes and body composition

HEALTH VARIABLES	CONTROL (N = 70)		INTERVENTION (N =81)		MEAN DIFFERENCE (95%CI)
	Baseline M (SD)	6 months M (SD)	Baseline M (SD)	6 months M (SD)	
SBP (MM HG)	135.82 (16.20)	140.39 (15.06)	133.92 (16.59)	129.80 (10.27)	7.69* (3.11 to 11.37)
DBP (MM HG)	77.1 (9.8)	81.9 (6.8)	76.7 (10.8)	73.92 (8.68)	7.29* (5.46 to 9.71)
BODY WEIGHT (K G)	84.50 (31.21)	84.66 (32.20)	83.5 (31.2)	77.80 (20.3)	6.16* (3.24 to 9.52)
BMI (KG/M^2)	31.59 (6.19)	33.84 (6.70)	28.28 (4.40)	27.62 (5.7)	2.45* (2.54 to 4.06)

Note: SBP = Systolic Blood Pressure. DBP = Diastolic Blood Pressure M (SD) = Mean (Standard Deviation). CI = Confidence Interval. BMI = Body Mass Index.

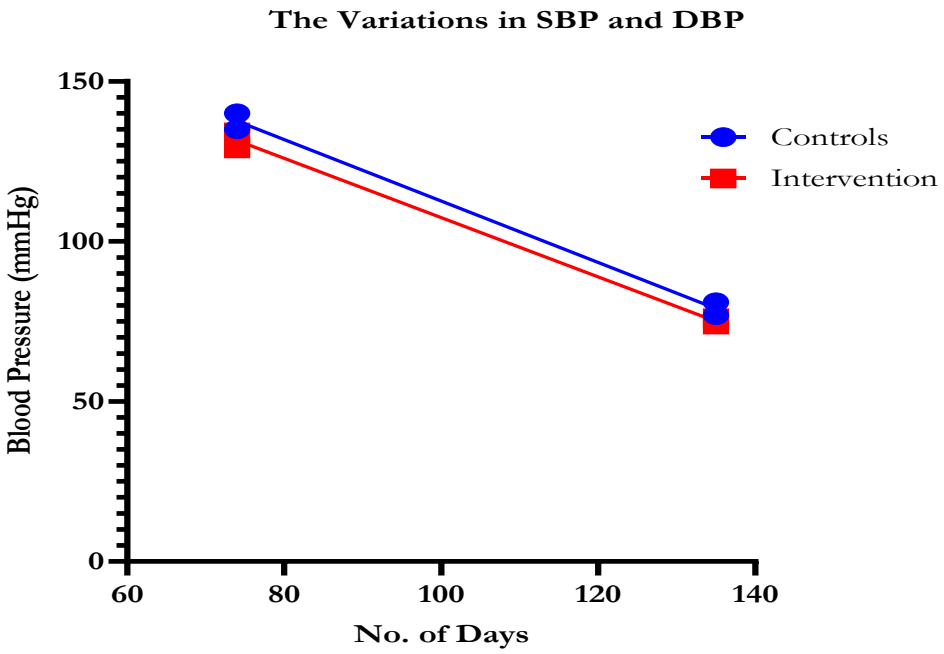

Figure 4: A Line Chart of the Variation sin Systolic Blood Pressure and Diastolic Blood pressure in Controls and Intervention.

In Table 5, On a 1-7 scale, emotional well-being increased from a baseline of 4.1 to 5.9 in the intervention group compared to 3.14 to 3.8 in the control group. Similarly, social well-being improved from 4.6 to 5.6 in the intervention group versus 3.18 to 3.5 in the control group. The same trend was observed for physical well-being (intervention: 3.2 to 4.9, control: 3.10 to 3.98). Moreover, exercise self-efficacy, measured on a 1-10 scale, showed a dramatic increase in the intervention group (3.4 to 7.2) compared to the control group (2.85 to 3.13) (see Figure 5).

Table 5: Analysis of the Participants Perceptions of the Intervention

HEALTH VARIABLES	**CONTROL (N = 70)**		**INTERVENTION (N = 81)**		**MEAN DIFFERENCE (95%CI)**
	Baseline M (SD)	6 months M (SD)	Baseline M (SD)	6 months M (SD)	
EMOTIONAL DOMAIN (1–7)	3.14 (1.13)	3.80 (1.11)	4.1 (0.96)	5.9 (0.67)	−1.32* (−1.45 to 0.99)
SOCIAL DOMAIN (1–7)	3.18 (1.19)	3.50 (1.11)	4.6 (0.87)	5.6 (0.78)	−1.42* (−1.36 to −0.89)
PHYSICAL DOMAIN (1–7)	3.10 (1.18)	3.98 (1.09)	3.2 (0.92)	4.9 (0.86)	−1.33* (−1.48 to −0.98)
EXERCISE SELF-EFFICACY (1–10)	2.85 (1.69)	3.13 (1.67)	3.4 (1.62)	7.2 (0.88)	−3.99* (−4.23 to −3.37)

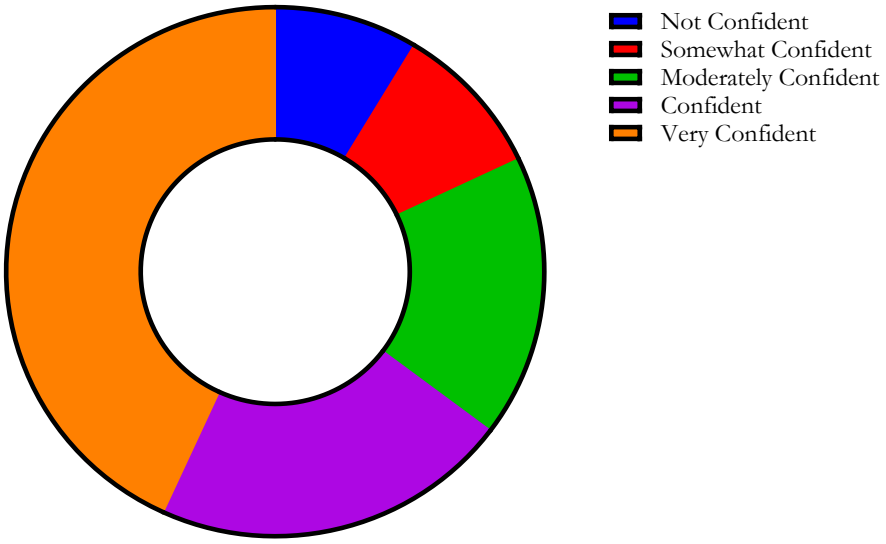

Figure 5: A pie Chart Showing The self-efficacy for exercising measured using the Exercise Self-Efficacy Scale in The Intervention Group

3.3 Perceptions of Participants about the Intervention on Lifestyle

Our analysis found that the intervention achieved high engagement with physical activity (PA) diaries. 85% of participants completed at least one goal, and 90% maintained diary entries throughout the 12-week program. However, adherence to diary completion declined slightly by 2% over the intervention period. All these aspects were discussed during regular phone consultations with the nurse to provide personalized feedback and guide future goal-setting. Lifestyle changes were observed after the exercise intervention with participants reporting changes in diet, sleep and stress management and no cases of smoking. Increased fruit and vegetable intake by 2 servings/day was achieved by incorporating a serving of fruit or vegetables at breakfast and with lunch or dinner. Increased sleep duration by 60 minutes/night involving a regular sleep schedule, creation of relaxing bedtime routine, and improving sleep hygiene. Also, participants recorded better stress management due to practicing relaxation techniques 3 times/week through deep breathing exercises, mindfulness meditation, or progressive muscle relaxation. The intervention was well-received by participants, with all (100%) reporting value in each aspect. This included setting goals, tracking progress with self-monitoring, and receiving feedback. They appreciated the delivery methods, which included in-person consultations, phone calls, and text messages. Participants identified several benefits, such as learning how to change their behaviour, receiving regular motivation and reminders, and feeling supported by the cardiac nurse. A trusting relationship developed through the program. A small number of participants (n=13) faced challenges to staying active after the intervention, citing poor health, time constraints, and lack of enjoyment. However, most participants reported overcoming these barriers by engaging

with the program, learning new strategies, and gaining a deeper understanding of the importance of physical activity for their health. At nine months, all participants who achieved recommended PA levels at six months (88%) maintained that level. Of the remaining participants, 9% expressed a positive intention to increase their activity.

4. Discussion

The findings propose a significant improvement in the HRQoL (health-related quality of life) in the intervention group compared to the control group. Participants in the intervention group reported improvements in emotional, social, and physical well-being. Therefore, the behavioural change intervention appears to have increased exercise self-efficacy, suggesting a potential long-term positive impact on behaviour. Also, there were notable improvements in the lifestyle of patients such as no smoking, improved stress management, increased intake of fruits and a change in diet plans coupled with improved sleeping patterns. We established that behavioural change intervention was effective and safe in changing the lifestyle of patients and increasing their levels of physical activity for increased health and positive outcomes. The observed changes in the lifestyle of patients plays a critical role in the improving their quality of life after coronary intervention. The cessation of smoking is important because smoking constitutes a major risk factor for several heart diseases and despite being diagnosed with CAD, increased smoking could make participants susceptible to secondary infections such as lung cancer (Chen et al., 2019; Laytragoon Lewin et al., 2021; Lee et al., 2021). Moreover, smoking increases the narrowing of arteries and possibility of blood clotting. As a result of the behavioural change intervention, it was a positive outcome to observe that participants ceased smoking which boosted their health, recovery process and overall quality of life. Our study observed dietary changes by from the behavioural intervention group which enhanced increased intake of healthy diet of fruits and vegetables. Healthy diets have been reported to be efficacious in the management of cholesterol levels, blood pressure and weight. Thus, it is a significant change in lifestyle of these patients which increases their recovery process and quality of life. The increased intake of vegetables, lean proteins, whole grains and fruits is a beneficial source of all nutrients required for good health. The behavioural change intervention increased the health-related quality of life among participants and was consistent with previous studies reporting on these interventions with improvements in diet, smoking and stress management (Rathore et al., 2020; Thomas et al., 2019; Uddin et al., 2020). Our follow-up assessment obtained reductions in the impact of CAD due to improved health conditions and adherence to the behaviour intervention program. This finding was critical because low quality of life has negative effects and adverse outcomes on the capacity of individuals to sustain the benefits derived from the behavioural intervention program. Moreover, we found a positive reduction in the blood pressure of patients as the number of days of

participating in the intervention increased. It is positive trend because exercise lowers blood pressure, enhances blood circulation to body parts, makes the heart stronger, and improves psychological health (Okechukwu, Masala, D'Ettorre, & LA TORRE, 2022). Often, CAD patients are physically unfit and lack the capacity. The importance of physical activity spells the need for encouraging physical exercise among CAD patients.

We observed that there were low attrition rates and significant positive feedback from participants in the intervention group who demonstrated a higher perception and acceptance of this behaviour change program. The utilisation of text-messages as reminders ensured that participants were sufficiently informed of their goals and objectives throughout the program. Although, at the end of the study, we only found that 9% were willing to continue with the program, it was still a positive trend. Similarly, previous studies have postulated a significant emphasis on the delivery of behavioural change interventions using telephone follow-up messages or applications and face-to-face consultations with medical professionals (Arrigo, Brunner-LaRocca, Lefkovits, Pfisterer, & Hoffmann, 2008; Furber et al., 2010). A study by Blake et al. found that there has been an increased adoption of mobile phone text messages in supporting healthcare operations and behavioural change interventions with significant benefits and improved outcomes in physical activity (Blake, Suggs, Coman, Aguirre, & Batt, 2017). The constant reminders of text messages ensure a proper mechanism of reducing medical costs and regular meetings with healthcare professionals. Arrigo et al. suggested that behavioural change interventions cannot be designed and implemented in supervisory or non-supervisory modes in CHD patients (Arrigo et al., 2008). Although, the conventional models of behavioural change interventions proposed by the previous studies have shown an increase in the efficiency and efficacy of increasing physical activity, these studies have often been criticised for missing gaps such as adequate details on the strategies used in behavioural change interventions and lack of patient centered care and improvement in quality of life. Moreover, they have not provided feedback on the progress of patients (Furber et al., 2010; Kamel, Hafez, & Bastawy, 2021; Rodrigues et al., 2013).The behavioural change intervention program resulted to a significant reduction in the weight of participants coupled with a reduction in BMI. These findings have clinical implications in the effective management of obesity because more than 80% of our sample were reported to be overweight and obese; however, these values reduced to less than 70% after 180 days of follow-up. Weight management is critical in reducing the risk of comorbidities and increased adaptations to physical activities. Obesity and increased body fat percentage are indicators of cardiovascular diseases and their risk factors (Sheibani et al., 2020). Therefore, balancing body fat percentage and BMI to attain the required threshold is prescribed to CAD patients. Often, comprehensive rehabilitation management and the behavioral change theory are used to downregulate body fat percentage and BMI among CAD patients.

Previous studies have proposed that physical activities could contribute smaller effects to the body composition such as body weight when used alone and independent of dietary interventions (Brubaker, Ross, & Joo, 2018; Garber, 2019; Khorshid, Adelhady, Elgarhy, & Mahmoud, 2020). These findings complement our study because we observed significant dietary patterns with increased intake of healthy diets of vegetables and fruits alongside increased physical activity which shows a significant clinical benefit of reduction in BMI. Additionally, these findings are consistent with previous reviews on the association between physical activity and body composition in overweight individuals.

5. Conclusion

The study established that behavioural change intervention program increased the healthcare related quality of life and lifestyle changes among participants. There were significant lifestyle changes reported in the intervention group such as cessation of smoking, improved sleep and stress management patterns and increased intake of healthy diets. We found reductions in BMI and blood pressure which are significant clinical outcomes in the treatment and management of CAD. Further studies are required to quantify the dose of the behavioural intervention program to assess which elements and components contributed to the observed effects or whether physical activity and lifestyle changes act in synergy to produce the observed effects. Increased exercising self-efficacy is a positive outcome in providing participants with essential life skills for self-management and control over their lifestyle behaviours. Overall, the findings suggest that exercise intervention has a positive impact on lifestyle and quality of life in individuals with coronary intervention.

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