Indian Heart Journal xxx (xxxx) xxx

Contents lists available at ScienceDirect

Indian Heart Journal

journal homepage: www.elsevier.com/locate/ihj

Short Communication

A multicentre retrospective study on quality and outcomes of cardiac rehabilitation programs in India

Priya Chockalingam [a, *], Anantharaman Rajaram [b], Arun Maiya [c], Aashish Contractor [d]

[a] Cardiac Wellness Institute, Chennai, Tamilnadu, India
[b] Frontier Lifeline Hospital, Chennai, Tamilnadu, India
[c] Manipal Academy of Higher Education, Manipal, Karnataka, India
[d] Sir HN Reliance Hospital, Mumbai, Maharashtra, India

ARTICLE INFO

Article history:
Received 8 February 2020
Accepted 12 March 2020
Available online xxx

Keywords:
Cardiac rehabilitation
Core components
Multidisciplinary team
Quality indicators
Outcomes

ABSTRACT

Cardiac rehabilitation (CR) programs in India are comprehensive in nature, consist of multidisciplinary teams and demonstrate significant improvement in various clinical parameters. However, there is a disparity in patient evaluation, risk assessment, data collection and documentation. CR programs in India need to be streamlined to meet the quality indicators outlined by the international guideline recommendations.

1. Introduction

Cardiac rehabilitation (CR) is a Class 1 Level A recommendation in the management of cardiovascular disease. In a recent study to characterize the nature of CR programs around the world, Supervia et al[1] found that the overall quality of CR programs in India is high, ranking 3 on a scale of 1 (best quality) to 14 (poorest quality). We aimed to analyze the quality and outcomes of CR programs in the country.

2. Methods

Four CR centers from Maharashtra ($n = 1$), Karnataka ($n = 1$) and Tamilnadu ($n = 2$) participated in the study. Three centers were hospital-based and one was community-based. Availability of age, gender, indications for CR and pre-CR and post-CR 6-minute walk distances (6MWDs) was mandatory for inclusion. Heart rate, systolic blood pressure (SBP), diastolic blood pressure (DBP), body mass index (BMI) and left ventricular ejection fraction (LVEF) were retrieved when available. The effect of CR was analyzed in all subjects in whom pre-CR and post-CR parameters were available. In addition, the effect of CR on SBP and DBP and LVEF was analyzed in those with hypertension (SBP $\geq$ 140 mmHg and/or DBP$\geq$ 90 mmHg) and those with heart failure with reduced ejection fraction (HFrEF, LVEF $\leq$ 40%), respectively. The participating centers were assessed for the delivery of the 20 structure and process quality indicators outlined for global CR programs, as well as documentation or nondocumentation of the same. The members constituting the CR team and the accepted indications for CR were recorded.

3. Results

Of the 368 subjects included in the study (60 ± 12 years), 81% were male. The leading indication for CR was coronary artery disease ($n = 347$, 94% subjects); the other indications were cardiomyopathy, valvular heart disease, congenital heart disease, rheumatic heart disease and heart transplant. Management modalities adopted were CABG surgery in 52% subjects, percutaneous transluminal coronary angioplasty in 35%, cardiac device implantation in 6%, valve replacement or repair in 3% and alcohol septal ablation in 0.3% subjects.

A multidisciplinary team of health-care professionals was responsible for delivering the CR program in all the participating centers. The core components delivered, the CV risk factors

* Corresponding author. Cardiac Wellness Institute No.21, 5th Avenue, Besant Nagar, Chennai, 600090, India. Tel.: +9144 43192828, +91-9940408828.
E-mail address: priyachockalingam@cardiacwellnessinstitute.com (P. Chockalingam).

https://doi.org/10.1016/j.ihj.2020.03.002

Please cite this article as: Chockalingam P et al., A multicentre retrospective study on quality and outcomes of cardiac rehabilitation programs in India, Indian Heart Journal, https://doi.org/10.1016/j.ihj.2020.03.002

Table.1
Quality Indicators and their documentation in the participating centers.

Quality indicators	Maharashtra Hospital-based ($n = 219$)	Karnataka Hospital-based ($n = 60$)	Tamilnadu Hospital-based ($n = 30$)	Tamilnadu Community-based ($n = 59$)
Core components delivered				
Initial assessment	Yes/D	Yes/D	Yes/D	Yes/D
Risk assessment	Yes/ND	Yes/D	Yes/D	Yes/ND
Management of CV risk factors	Yes/D	Yes/D	Yes/D	Yes/D
Patient education	Yes/ND	Yes/D	Yes/D	Yes/D
Exercise training	Yes/ND	Yes/D	Yes/D	Yes/D
Nutrition counseling	Yes/D	Yes/ND	Yes/D	Yes/D
Stress management	Yes/D	Yes/ND	Yes/D	Yes/D
Tobacco cessation interventions	Yes/ND	Yes/ND	Yes/ND	Yes/D
Vocational counseling	Yes/ND	Yes/ND	No	No
Communication with primary care provider	Yes/D	Yes/D	Yes/D	Yes D
End of program reassessment	Yes/D	Yes/D	Yes/D	Yes D
CV risk factors assessed				
Blood pressure	Yes/D	Yes/D	Yes/D	Yes/D
Tobacco use	Yes/D	Yes/D	Yes/D	Yes/D
Physical inactivity	Yes/D	Yes/D	Yes/D	Yes/D
Body mass index	Yes/ND	Yes/D	Yes/D	Yes/D
Lipids	Yes/D	Yes/D	Yes/D	Yes/D
Poor diet	Yes/D	Yes/ND	Yes/D	Yes/D
Blood glucose/$HbA1_c$	Yes/D	Yes/D	Yes/D	Yes/D
Depression/anxiety	Yes/D	No	Yes/D	Yes/D
CR wait time	Yes/ND	<2 weeks	<4 days	<1 week
Total quality indicators met(/20)	20	19	19	19
Total quality indicators documented (/20)	13	14	18	18
Members in the CR team				
Physician	Yes	Yes	Yes	Yes
Physiotherapist	Yes	Yes	Yes	Yes
Dietitian	Yes	Yes	Yes	Yes
Psychologist	Yes	Yes	Yes	Yes
Nurse	No	Yes(phase-1)	Yes	No
Occupational therapist	No	Yes	No	No
Other (if any)	Exercise Specialist, Yoga therapist	No	Yoga therapist, Respiratory therapist	No
Member holding overall responsibility	Physician and Physiotherapist	Physician	Physiotherapist	Physician

D, Documented; ND, Non-documented; CR, Cardiac rehabilitation.

assessed and the members constituting the CR team are outlined in the Table 1.

The frequency of sessions was 1–3 per week. A combination of continuous aerobic exercise and strength training was used in the exercise sessions which typically included a warm-up of 5–10 min, an exercise period of 30–40 min and a cool-down of 5–10 min. The aerobic exercises consisted of free exercises, treadmill walking and recumbent cycling; the intensity of aerobic exercise was monitored using the Borg scale of perceived exertion. Strength training was administered either as body weight training or by using dumbbells and weight cuffs weighing between 0.5 and 2 kg. The median number of CR sessions attended was 24 (Interquartile range [IQR]: 12–40) and the median duration of CR was 12 weeks (IQR: 7–26).

There was a significant improvement in BMI (27 ± 4 kg/m^2 to 26 ± 4 kg/m^2, $p = 0.0001$), DBP (70 ± 10 mmHg to 69 ± 9 mmHg, $p = 0.045$) and 6MWD (348 ± 100 to 437 ± 117 m, $p < 0.0001$) in all subjects and a significant change in SBP (150 ± 15 mmHg to 132 ± 13 mmHg, $p = 0.0001$) and LVEF ($33 \pm 6\%$ to $37 \pm 9\%$, $p < 0.0001$) in the group with hypertension and HFrEF respectively.

4. Discussion

To the best of our knowledge, this is the first multicentre study analyzing the quality and outcomes of CR programs in India. The main findings of the study are that the CR programs provided by the participating centers are comprehensive in nature, are composed of multidisciplinary health-care teams and are able to demonstrate significant improvement in anthropometry, blood pressure, functional capacity, and cardiac function. However, there is a disparity between the centers in patient evaluation, risk factor assessment, data collection, and documentation making it clear that systems and processes need to be put in place to meet the quality indicators in relation to the international guideline recommendations.

The low participation of women in CR programs is a globally recognized phenomenon and the reasons attributed to this are lower education level, multiple comorbid conditions, lack of social support and high burden of family responsibilities.[2] Only 19% of participants were women in the present study, reflecting this global pattern.

Using simple but reliable assessment tools such as the 6MWT,[3] providing group exercise sessions using minimal equipment, improving awareness about locally available heart-healthy foods, timely dissemination of evidence-based information and education and goal-setting technique to modify health behavior are beneficial strategies that could be applicable in low-resource settings such as India.[4]

In conclusion, more CR facilities with systematic documentation protocols and prospective studies on the effects of CR programs in India are warranted.

Funding

None.

Please cite this article as: Chockalingam P et al., A multicentre retrospective study on quality and outcomes of cardiac rehabilitation programs in India, Indian Heart Journal, https://doi.org/10.1016/j.ihj.2020.03.002

Conflict of interest

The Authors declare that there is no conflict of interest.

Acknowledgments

The authors sincerely thank Vaishnav Natarajan, Jaini Patel, Padma Kumar, Mohammad Hadadzadeh and Rosemary Devanesan for their assistance in data collection and interpretation.

References

1. Supervia M, Turk-Adawi K, Lopez-Jimenez F, et al. Nature of cardiac rehabilitation around the globe. *EClinicalMedicine*. 2019;13:46–56.
2. Supervia M, Medina-Inojosa JR, Yeung C, et al. Cardiac rehabilitation for women: a systematic review of barriers and solutions. *Mayo Clin Proc*. 2017;92:565–577.
3. Bellet RN, Adams L, Morris NR. The 6-minute walk test in outpatient cardiac rehabilitation: validity, reliability and responsiveness-a systematic review. *Physiotherapy*. 2012;98:277–286.
4. Chockalingam P, Sakthi Vinayagam N, Ezhil Vani N, Chockalingam V. Outcomes of a multidisciplinary coronary heart disease prevention programme in southern India. *Heart Asia*. 2016;8:39–44.

Please cite this article as: Chockalingam P et al., A multicentre retrospective study on quality and outcomes of cardiac rehabilitation programs in India, Indian Heart Journal, https://doi.org/10.1016/j.ihj.2020.03.002