International Journal of Health Sciences and Research
Vol.10; Issue: 2; February 2020
Website: www.ijhsr.org
Review Article *ISSN: 2249-9571*

Physiotherapy Management for Breast Cancer Related Lymphedema (BCRL): An Evidence Based Study

Ruchita K. Dudhagara[1], Karishma Jagad[2]

[1]F.Y.M.P.T. Student, [2]Senior Lecturer,
Department of Physiotherapy, Government Physiotherapy College, Jamnagar, Gujarat, India

Corresponding Author: Ruchita K. Dudhagara

ABSTRACT

Breast cancer is the most frequent malignancy in women. Lymphedema is a significant health issue for cancer survivors. It affects 21.4%, indicating 1 in every 5 patients following breast cancer treatment. Problems associated with lymphedema include pain, altered sensation, such as discomfort and heaviness, difficulty with physical mobility, psychological distress, recurrent infections and social isolation. So, lymphedema management in breast cancer survivors is used in the field of rehabilitation to improve patient's functional abilities. Physiotherapy treatment should include Compression bandage, Active Resistive Exercise with Complex Decongestive Physiotherapy, Low Level Laser Therapy (LLLT), Physical Exercise (Aqua lymph training, Swimming, Yoga, Aerobic), Kinesiological Taping (KT). BCRL is chronic (ongoing) condition. Advance Pneumatic compression device (APCD) is used for home maintenance phase. We have reviewed the available literature on Breast cancer related lymphedema to explore the best management strategies.

Keywords: Breast cancer related Lymphedema, A systematic review, Physical exercise, Manual lymphatic drainage, Pneumatic compression, Low level laser therapy, Kinesiological Taping

INTRODUCTION

Cancer is a disease caused when cell divide uncontrollably and spread into surrounding tissues.[1] Nowadays, breast cancer is most frequent malignancy in women, with an incidence of 35-44 new cases 100,000 women per year.[2] There are several different types of treatments for breast cancer included, Mastectomy, Axillary lymph node dissection(ALND) and Regional lymph node radiation.[3] There are several potential side effects of breast cancer treatment such as pain and discomfort, infection, lymphedema, seroma etc.[4] Lymphedema is a significant health issue for cancer survivors.[5]In a recent meta-analysis, the overall estimated incidence of chronic arm oedema after breast cancer treatment was found to be 21.4%, indicating that BCRL is a widespread problem affecting 1 in every 5 patients following breast cancer treatment.[6] BCRL results from disruption to the lymphatic system that prevents adequate drainage from lymphatic vessels causing protein-rich lymph fluid to accumulate in the interstitial space.[7]Problems associated with lymphedema includes pain, altered sensation, such as discomfort and heaviness, difficulty with physical mobility, psychological distress, recurrent infections and social isolation.[8]

Physiotherapy treatment of BCRL, several methods have been used with varying results.[9] Compression bandage, Active resistive exercise with complex decongestive physiotherapy, Physical exercise(Aqua lymph training, swimming, yoga, aerobic), Kinesiological taping, Low level laser therapy(LLLT) and Advanced pneumatic compression device(APCD) – all are used for management and home

maintenance phase of BCRL. Treatment outcomes are measured by volumetric measurement or circumferential measurement at baseline and at the end of treatment phase. Evidence based research is needed to document the therapeutic effect of different technique in various presentation.

INCLUSION CRITERIA FOR ARTICLES

- Articles were published in last 10 years. (2009 to 2019)
- The articles that includes subjects with breast cancer related lymphedema (BCRL).
- The articles that includes physiotherapy intervention for management of BCRL.
- Circumferential or volumetric measurement as one of the primary outcome measure.

EXCLUSION CRITERIA FOR ARTICLES

- Articles were published before 10 years.
- The articles that includes subjects with lymphedema due to another condition.
- The articles that not include physiotherapy intervention for management of BCRL.

METHODOLOGY

In order to collect evidences for the effectiveness of physiotherapy intervention on lymphedema, articles were searched and gathered.

The articles were searched in Google scholar, PubMed, Elsevier, Cochrane library by using keywords like Breast cancer related Lymphedema, A systematic review, Physical exercise, Manual lymphatic drainage, Pneumatic compression, Low level laser therapy, Kinesiological Taping. The articles were taken from Bio Med Control (BMC), Breast cancer Research and Treatment, World Journal of Surgical Oncology, Oncology Research and Treatment, Archives of Physical Medicine and Rehabilitation, An International Journal of Physical Therapy, Support care cancer and Journal of Vascular Surgery.

Table 1: Physiotherapy Management of BCRL

Author	Sample design/ no. Of articles and subjects	Intervention	Outcome measures	Result	Level of evidence
G. David Baxter et al. (2017)	A Systematic review of Low-level laser therapy (LLLT) for BCRL (7 RCTs were analysed)	Study group received LLLT with most common wavelength used was 904 nm and energy densities were 1.5 J/cm^2 and 2.4 J/cm^{2}at the cubital fossa and the axillary region; control group received no treatment or any active treatment other than LLLT for 3 treatment/ week, variation in duration from 4 to 12 weeks.	Primary outcome measures were limb circumference/volume, and secondary outcomes included pain intensity and range of motion.	LLLT in the management of BCRL is more effective for limb oedema reduction than sham and no treatment at a short-term follow-up, and not more effective than other conventional treatments.	1a
Yi Shao et al. (2014)	A Systematic review and Meta-Analysis of Intermittent Pneumatic Compression Pump (IPC) for BCRL (7 RCTs with 287 patients were included)	Experimental group received IPC with 40 – 60 mmHg pressure for 20 min to 2 hours; control group received Decongestive lymphatic therapy or manual lymphatic drainage without ICP for variation in duration from 10 days to 15 weeks.	Primary outcome was the percent of volume reduction. Secondary outcomes were subjective symptoms and joint mobility.	This trials fail to show the effectiveness of the addition of an ICP to the routine management of BCRL.	1a
Tsai-Wei Huang et al (2013)	A Systematic review and Meta-analysis of Manual Lymphatic Drainage (MLD) On BCRL (10 RCTs with 566 patients were analysed)	Intervention group received conventional therapy with MLD; Control group received conventional therapy like, ICP, Bandage compression, Massage, Exercise without MLD for variation in duration from 2 weeks to 4 weeks.	The primary outcome for prevention was the incidence of post-operative lymphedema. The outcome for management of lymphedema was a reduction in oedema volume.	This trail does not found significant difference in the incidence of lymphedema in patients treated with or without MLD.	1a

Table to be continued…					
Karina Tamy Kasawara et al (2018)	A systematic review with Meta-analysis of Kinesio Taping (KT) on BCRL (7 RCTs were analysed)	Experimental group received KT with conventional therapy; Control group received conventional therapy without KT for 4 weeks.	Volumetric measurement was used as outcome measure at before and after treatment.	KT was effective on postmastectomy lymphedema related to breast cancer, How-ever it is not more effective than other treatments.	1a
F.T. Baumann et al (2018)	A systematic review of physical exercise on BCRL (11 RCTs with 458 patients were analysed)	Intervention group received different type of exercise consisted of Aqua lymph training, Swimming, Resistance exercise, Yoga, Aerobic, Gravity resistive exercise for varied sessions from 1 to 7 session/week, varied duration from 8 weeks up to 1 year; Control group maintained their usual care and continue their usual daily activities.	Primary outcome was circumferential measurement or volumetric measurement. Secondary outcome measure was Quality of life (QOL).	This trial indicates that exercise can improve subjective and objective parameters in BCRL patients, with dynamic, moderate and high frequency exercise appearing to provide the most positive effects.	1a
Caroline E. Fife et al. (2012)	RCT comparing 2 types of Pneumatic compression (PCD) for BCRL at home. A total no of subject 36 (18 per group)	Group 1 received Upper extremity treatment program (UE01) with standard pressure from advanced PCD (APCD, Flexi touch system HCPCSEO652); Group 2 received 30 mmHg pressure compression from standard PCD (SPCD, Bio compression 2004, HCPCSEO651) at home for 1h/day for 12 weeks.	Arm volume and girth measurement were taken as an outcome measure.	This study suggest that for the home maintenance phase of treatment of arm lymphedema, APCD provides better outcomes than with a SPCD.	1b
Kim DS et al. (2010)	RCT of Active resistive exercise on BCRL N=40, Active resistive exercise group=20 and non-active resistive exercise group=20	In the active resistive exercise group, after complex decongestive physiotherapy, active resistive exercise was performed for 15min/day, 5 day/week for 8 weeks. The nonactive resistive exercise group performed only complex decongestive physiotherapy for 5 days/week for 8 weeks.	The circumferences of the upper limbs for volume changes, and the SF-36 questionnaire for quality of life (QOL).	Active resistive exercise with complex decongestive physiotherapy was significantly reduced proximal arm volume and improve QOL.	1b
Robert J. Damstra et al (2009)	RCT of compression therapy in BCRL A Total no of subject = 36 (18 per group)	Group A received bandages with low interface pressure (20-30 mmHg) and Group B received bandages with high interface pressure (44-58 mmHg); The bandages were removed after 2 hours in order to measure the short-term volume reduction and new bandages were applied for the next 24 hours within the same pressure range.	The main outcome measures were reduction of arm volume. Secondary outcome parameters were changes in sub-bandage pressure and patient comfort (VAS).	Inelastic, Multilayer, Multicomponent compression bandages with lower pressure (20-30mmHg) are better tolerated and achieve the same amount of arm volume reduction as bandages applied with higher pressure (45-58 mmHg) in the first 24 hours.	1b

CONCLUSION

There are different levels of evidences found of physiotherapy intervention for BCRL. It can be concluded that there is a strong evidence supporting the reduction in arm volume by using Low level laser therapy (LLLT), Kinesio taping (KT) and Physical exercise. There are moderate evidence suggesting Active Resistive exercise as an adjunctive method and Compression Bandage with lower pressure (20-30 mmHg) for lymphedema reduction. Advanced Pneumatic Compression device (APCD, Flexi touch system HCPCSEO652) is used for home maintenance phase of treatment of arm lymphedema. There are strong evidence suggesting Manual Lymphatic Drainage (MLD) and Intermittent Pneumatic Compression (IPC) not effective for management of lymphedema.

CONFLICT OF INTREST

There was no personal or institutional conflict of interest for the study.

SOURCE OF FUNDING

No fund was used.

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How to cite this article: Dudhagara RK, Jagad K. Physiotherapy management for breast cancer related lymphedema (BCRL): an evidence based study. Int J Health Sci Res. 2020; 10(2):162-165.

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