IOSR Journal of Nursing and Health Science (IOSR-JNHS)
e-ISSN: 2320–1959.p- ISSN: 2320–1940 Volume 5, Issue 1 Ver. VII (Jan. - Feb. 2016), PP 34-36
www.iosrjournals.org

Impact of Physioball Exercises among Type Ii Diabetes on Glycaemic Control and Hypertension

Subramanian. S. S.[1], Venkatesan. P[2], Deepa .S[3]
[1]*the Principal Sree Balaji College Of Physiotherapy Chennai-100*
[2]*retired Professor Emeritus Department Of Advanced Zoology, Loyola College, Chennai -34.*
[3]*assistant Professor Sree Balaji College Of Physiotherapy*

Abstract:
Background*: Physical activities using Physioball among type II diabetes and its impact on glycaemic control and hypertension have not been studied before among Indian population*
Methods*: Known 100 type II diabetes mellitus patients with hypertension are allotted at random in two groups. Group I forms the control group, group II allotted with specific exercises using Physioball. Weekly thrice for 12 weeks duration. Pre and post HbA_1C and blood pressure of all subjects are measured. Questionnaires related to diabetes and HTN are processed. Due ethical committee and consent forms from all subjects are obtained.*
Results*: A reduction of HbA_1C by percentage by 0.75% Systolic blood pressure by 4 mm/Hg and Diastolic blood pressure by 2 mm/Hg while group I subjects remained insignificant changes in their HbA1C and blood pressure*
Conclusion: *Physical activities using Physioball among type II diabetes lowering their blood pressure and improving glycaemic control is effective in preventing cardiovascular complications and promote health care of type II diabetic patients.*
Key Words*: Hypertension, HbA_1C*

I. Introduction

Known diabetes type II mellitus among Indian population is 63 million (1) WHO predicted HTN in India is 32.5% (2) 21 % of Tamilnadu population are known hypertensive (3) moderate intensity physical activity have been demonstrated to have an effect on changes in arterial function and an improved arterial stiffness(4) . Reduction of HbA_1C among type II diabetic was reported using Physioball (5). This non pharmacological means of treatment using specific Physioball exercises aims to evaluate the efficacy of this form of physical activity among type II diabetic patients who are hypertensive on glycaemic control and blood pressure

II. Materials

Baseline data are collected using questionnaires. Following ethical committee approval, getting consent forms from the subjects, this study was conducted between 2008- 2011 at Sree Balaji College of Physiotherapy Chennai -100. Fasting HbA_1C and blood pressure of all the subjects were measured twice once at the beginning and after 12 weeks completion of study.

III. Methodology

100 known type II diabetic with hypertension subjects are recruited from special diabetic camp conducted following an advertisement in The Hindu, Indian national Newspaper in May 2010. They are allotted at random in two groups. Group I – control group, group II – experimental group. All the subjects continued their day to day routines. Group II subjects have performed specific exercises using Physioball in lying, side lying, prone, and sitting postures
Frequency: Thrice a week Duration: 12 weeks
Progression of exercises is based on FIT as recommended by ACSM

IV. Results

Pre and post HbA_1C, systolic and diastolic blood pressure were tabulated for all subjects and due statistical analysis are applied

Table 1 Baseline details on age type of diabetic medication, CAD and lipidemia of all subjects

FACTORS		PERCENTAGE %
AGE (years)	31-40	21
	41-50	38

	51-60	41
CAD	-	41
TYPE OF DIABETIC MEDIACTION	METFORMIN	48
	SULPHONYL	35
	MET+ SULPH	17
ON MEDICATION FOR LIPIDEMIA		17

TABLE 2 Results of paired' test on and means values of group I and II on HbA_1C

HbA_1C	Mean	SD	SE	Level of significance
GROUP I (control subjects)	PRE = 7.72		0.04	>0.1
	POST = 8	0.28		
GROUP II (experimental subjects)	PRE = 8			
	POST 7.25	1.25	0.18	P<0.001

TABLE 3 Results of paired't' test on systolic and diastolic blood pressure and mean values of group I and group II

		MEAN	SD	SE	LEVEL OF SIGNIFICANCE
SYSTOLIC BLOOD PRESSURE	GROUP I	122	1.94	0.27	P> 0.1
		127			
	GROUP II	128	6.60	0.94	P<0.001
		124			
DIASTOLIC BLOOD PRESSURE	GROUP I	82	1.67	0.24	P >0.1
		83			
	GROUP II	83	6.87	0.97	P< 0.01
		81			

V. Discussion

Studies have reported 35% diabetic patients to have coronary artery disease (6). Findings of this study are similar with 41% of this study subject to be having known CAD.There are recordings with resisted exercises, which have reported to be lowering the systolic blood pressure by 7mm Hg and diastolic blood pressure by 4 mmHg among diabetic mellitus(7). In concurrent with the above study results of this study using physioball where subjects own body weight forms the resistance lowering of systolic blood pressure by 4 mm Hg and diastolic blood pressure by 2 mmHg

Mechanism of an improved blood pressure with resisted exercises could be due to changes in vascular function, carotid artery intima, thickness can be reversed (8) and an increased exercise capacity any muscle (9). Reduction of HbA1C by 7% as displayed in table 1 is similar to findings in the studies (10) have shown a reduction of HbA1C by 8% among diabetic subjects using resisted exercises

A reduction on HbA1C reduced the risk of diabetic complications such as myocardial ischemia (11). Mechanism of reduction are improved storage and utilization of glucose in muscle (12) and an increased capillary to muscle ratio, movement of glucose transporters (GLUT4) to the plasma membrane independent of insulin and loss of fat (13)

References

[1]. Anjana, RM, Pradeepa. R. Deepa .M, Dalta. M, Sudha .V et al 2011, prevalence of diabetes and prediabetes. (ICMR – INDIAB) Study diabetalogia 54: 3022- 3027. 2011 Dec;54(12):3022-7. doi: 10.1007/s00125-011-2291-5. Epub 2011 Sep 30.

[2]. Prevalence of diabetes and prediabetes (impaired fasting glucose and/or impaired glucose tolerance) in urban and rural India: phase I results of the Indian Council of Medical Research-INdia DIABetes (ICMR-INDIAB) study.

[3]. Anjana RM[1], Pradeepa R, Deepa M, Datta M, Sudha V, Unnikrishnan R, Bhansali A, Joshi SR, Joshi PP, Yajnik CS, Dhandhania VK, Nath LM, Das AK, Rao PV, Madhu SV, Shukla DK, Kaur T, Priya M, Nirmal E, Parvathi SJ, Subhashini S, Subashini R, Ali MK, Mohan V; ICMR–INDIAB Collaborative Study Group WHO 2008 report on hypertension in India

[4]. J Hypertens. 2014 Jun; 32(6): 1170–1177.

[5]. Published online 2014 Apr 30. doi: 10.1097/HJH.0000000000000146 PMCID: PMC4011565

[6]. Hypertension in India: a systematic review and meta-analysis of prevalence, awareness, and control of hypertension

[7]. Raghupathy Anchala,[a,b] Nanda K. Kannuri,[b] Hira Pant,[b] Hassan Khan,[a] Oscar H. Franco,[c] Emanuele Di Angelantonio,[a]and Dorairaj Prabhakaran[d]

[8]. Devi.P, Rao M , Sigamani et al 2013 prevalence , risk factors and awareness of hypertension in India

[9]. J Hum Hypertens. 2013 May;27(5):281-7. doi: 10.1038/jhh.2012.33. Epub 2012 Sep 13.

[10]. Prevalence, risk factors and awareness of hypertension in India: a systematic review.

[11]. Devi P[1], Rao M, Sigamani A, Faruqui A, Jose M, Gupta R, Kerkar P, Jain RK, Joshi R, Chidambaram N, Rao DS, Thanikachalam S, Iyengar SS, Verghese K,Mohan V, Pais P, Xavier D

[12]. BAYNARD T and Carhort : R-L , 2008 , short term training effects on diastolic function in obese persons with metabolic syndrome obesity ; 16 ; 1277-1283

[13]. Korean Circ J. 2010 Apr; 40(4): 179–184.

[14]. Published online 2010 Apr 23. Doi: 10.4070/kcj.2010.40.4.179 PMCID: PMC2859335

[15]. The Effects of an Exercise Program on Anthropometric, Metabolic, and Cardiovascular Parameters in Obese Children

[16]. Yun Hee Lee, MD,[1] Young Whan Song, MD,[2] Hae Soon Kim, MD,[1] Sun Young Lee, MD,[3] Hee Seong Jeong, MD,[4]Sang-Hoon Suh, PhD,[4] Jin Kyoung Park,[5] Jo Won Jung, MD,[6] Nam Su Kim, MD,[7] Chung Il Noh, MD,[8] and Young Mi Hong, MD[1]

[17]. Subramanian S.S. and Venkatesan .P 2012, stability ball exercises in type II diabetic patients .J of research in biology 2(4) ; 403 - 409
[18]. Mohan .V Krishnan, G.K, Deepa .R and Rani, S.C.S. 2005 – Association of physical inactivity with components of metabolic syndrome and CAD, Diabetes medicine. 22: 1206 – 1211. J Clin Diagn Res. 2012 Nov; 6(9): 1528–1530.
[19]. Published online 2012 Nov 15. doi: 10.7860/JCDR/2012/4264.2550 PMCID: PMC3527787
[20]. Value of Indian Diabetes Risk Score among Medical Students and Its Correlation with Fasting Plasma Glucose, Blood Pressure and Lipid Profile
[21]. Anand Vardhan,[1] Adhikari Prabha M.R.,[2] Kotian Shashidhar M.,[3] Nithya Shankar,[4] Sandhya Gupta,[5] and Amruta Tripathy[6]
[22]. Carmen castendea, Layne, J.E, Munozorians 2009, A randomized controlled trial of resistance exercise training among type II diabetes. I.J of medicine , P515- 4
[23]. A Randomized Controlled Trial of Resistance Exercise Training to Improve Glycemic Control in Older Adults with Type 2 Diabetes Castaneda, Carmen: Layne, Jennifer E; Munoz-Orians, Leda; Gordon, PatriciaL; Walsmith Joseph; Foldvari, Mona; Roubenoff, Ronenn; Tucker, Katherine; Nelson, Miriam
[24]. Kims .N. Lee, S.J Kang, E.S and Hut K.Y 2006. Effects of life style modifications on metabolic parameters and carotid intima media thickness in type II diabetes. Metabolism 55: 1053 – 1059
[25]. Metabolism. 2006 Aug; 55(8):1053-9. Effects of lifestyle modification on metabolic parameters and carotid intima- media thickness in patients with type 2 diabetes mellitus.
[26]. Kim SH[1], Lee SJ, Kang ES, Kang S, Hur KY, Lee HJ, Ahn CW, Cha BS, Yoo JS, Lee HC
[27]. Loimala A, Strolm; K.G and Rinnem 2009, effect of long term endurance and strength training on metabolic control and arterial elasticity in patients with type II diabetes mellitus A.M.J of Cardiology 103: 972-927.
[28]. Tokmakidas S, Zois C and Kosa .K 2004. The effects of combined strength and aerobic exercise programme in women type II diabetes. EJ of applied physiology 92: 437- 442.
[29]. Strattan IM ,Cull , C.A ,Alder, A.2 and Hal man R.R 2006 , Addictive effects of glycaemia and blood pressure on risk of complications on type II diabetes diabetologia 49, 1761 – 69
[30]. Cardiovasc Diabetol. 2010; 9: 45. Published online 2010 Aug 30. doi: 10.1186/1475-2840-9-45 PMCID: PMC2940872
[31]. Therapies for type 2 diabetes: lowering HbA1c and associated cardiovascular risk factorsL Romayne Kurukulasuriya [1] **and** James R Sowers[1, 2]
[32]. Zuuso S, Jimenz and Pugliese G 2009 Exercise for the management of type 2 diabetes mellitus A review of the evidence , Acta diabetologia
[33]. Diabetes Metab Syndr Obes. 2013; 6: 233–239.
[34]. Published online 2013 Jul 3. doi: 10.2147/DMSO.S32951 PMCID: PMC3704296
[35]. Evidence for the benefit of exercise therapy in patients with type 2 diabetes Kenneth M Madden
[36]. Plough and Ralson 2002, exploring the whereabouts of GLUT4 in skeletal muscle. Molecular membrane biology ;19 ; 39- 49
[37]. EMBO Rep. 2005 Dec; 6(12): 1137–1142. doi: 10.1038/sj.embor.7400584 PMCID: PMC1369215 Review Article Review
[38]. Glucose transporter 4: cycling, compartments and controversies
[39]. Third in the Cycles Review Series Chandrasagar B Dugani[1] (Author photo) **and** Amira Klip[2,a] (Author photo)

Affiliations Limitations and Further Recommendations:

Type I diabetes are not included in this study. Study duration could be extended. Detraining of exercise Training is not studied. Other parameters like obesity are not included in this study. This study could be extended among children and other physical parameters can be studied further.

Acknowledgement:

Sincerely Acknowledge S.G.S clinic for cordinating to conduct Diabetic Camp. Thanks are to the Faculty and Management for having permitted to use infrastructural facilities for this original research study**.**