

Single Bout of Resisted Exercises Using Physioball on Random Blood Sugar on a Female Type II Diabetes Mellitus

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Received 13 June 2016; accepted 20 August 2016; published 23 August 2016

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Abstract

Lowering of random blood sugar on a female obese diabetic subject is the core of this case report. Single bout of high intensity exercises using Physioball helps to induce confidence in the subject.

Keywords

**TMT—Tread Mill Test, WHO: World Health Organisation, Physioball:
An Air Inflated Ball of Various Sizes**

1. Introduction

Global increases in obesity and Type II diabetes involve huge health care cost and morality. Non-communicable diseases including diabetes mellitus contribute to 52% of the total mortality in India as reported by [1]. Strong evidence indicates that physical inactivity is the main non-genetic risk factor for the development of major chronic diseases and premature death [2]. The prevalence of diabetes is growing rapidly worldwide and is reaching epidemic proportions [3]. A population based study of Chennai claims 21.4% to be diabetic [4]. ADA and ACSM have evidenced the benefits of exercises in type II diabetes. An improved glycaemic control among diabetics with lowering hba1c was recorded [5]. The objective of this case study was the effectiveness of single bout of resisted exercises on a female type II diabetic subject on RBS, first of its kind and an innovative mean.

1.1. Background Information

The impact of combined yoga and Physioball exercises among diabetic subjects was recorded [6] and the efficacy of single bout of exercises with Physioball on RBS was carried out in this study.

How to cite this paper: Subramanian, S.S. (2016) Single Bout of Resisted Exercises Using Physioball on Random Blood Sugar on a Female Type II Diabetes Mellitus. *Open Journal of Therapy and Rehabilitation*, 4, 174-177.
<http://dx.doi.org/10.4236/ojtr.2016.43016>

1.2. Past Medical History

Patient being obese diabetic and hypertension tried going to gym, walking etc. She is undergoing this innovative exercise since January 2015 till today with a frequency of twice a week.

Mrs. XXXX aged 45 years, regularly menstruating, married and mother of two boys with known family History of HTN and Diabetes Mellitus. She was treated by her physician with Tablet Eritel, Tablet Crevast and Tablet Metformin.

On Physical Examination: Endomorph, Ambulant unaided, peripheral joints and spine Range of Motion full and free with nil Neuro muscular deficits. TMT: 15 minutes, she was able to complete with good exercise tolerance level.

Anthropometric Parameters:

Height: 156 cm;

Weight: 80 kg; BMI: 33 kg/cm²;

Waist circumference: 96 cm;

Hip: 118 cm;

Lipid profile: total cholesterol as on 19-12-2015: 221 mg/dl;

Triglycerides: 179 mg/dl;

HDL: 32 mg/dl;

LDL: 153 mg/dl;

Blood sugar profile: hba1c: 7.2%;

Fasting: 132 mg/dl;

Post prandial: 149 mg/dl.

This original study was conducted by 05:00 PM on 30-01-2016 with 30 minutes of manual resisted exercises along with Physioball with the subject sitting on the ball, supine, side, and prone lying positions. **Duration:** 35 minutes. **Set of Exercises:** 10 sets of exercises to both upper, lower extremities and trunk. **Repetition:** 2 sets exercises were done 80% of maximum heart rate exercises were performed. **Care:** Checked for hypoglycaemic and no breath holding during exercises nature of exercises: resisted exercises.

1.3. Key Points

- Both upper extremities, trunk and lower extremities are involved in this regime.
- Few exercises are of the closed kinematic nature improving proprioception.
- Most of the exercises involve cocontraction of multiple muscles.
- Profuse sweating was recorded during exercises which not only promote sweat gland activities but has detoxification/ antioxidant effects.

2. Results

The subject had full vegetarian lunch by 01:00 PM and this study was carried around 05:00 PM. The following are the physiological changes measured prior and after.

3. Discussion

Previous case study published by the author of single bout of Physioball exercises in decreasing of post prandial blood sugar by 44 mg on a male diabetic is note worthy [6]. While in this study a reduction of random blood sugar of 40 mg on a female diabetic using a single bout of Physioball exercises, where results are similar. possible mechanism behind post prandial reduction of blood sugar by 40 mg using Physioball as reported in **Table 1** are supported by the following researches. Single bout of exercises in muscle leads to translocation of GLUT4 to the sarcolemmal membrane, which acutely enhances glucose transport capacity [7] exercise increases muscle blood flow, recruitment of muscle capillaries, and glucose transporters, by an increase in muscle metabolic rate and by increasing insulin sensitivity. Endogenous insulin secretion may be reduced by exercise [8]. Supply of exogenous glucose diminishes glycogen breakdown during exercise and enhances [9]. Glycogen replenishment after exercises single session of exercise is able to reverse obese induced JNK activation [10] and consequently promote increased insulin sensitivity [11] MAPK activity increases during exhaustive acute exercise [12].

Table 1. Heart rate, blood pressure and random blood sugar of the subject before and after exercises.

Prior to exercise in sitting posture	Post exercise in sitting posture
Heart rate 87/mt	140/mt
Blood pressure 144/84 mm/ng	141/78 mm/ng
Random blood sugar 146 mg	106 mg

4. Conclusion

Physical activity is a major tool in the holistic diabetic care. This case report with a single bout of resisted exercises on RBS using Physioball increases confidence of the patient towards lowering blood sugar, which can be used to promote to improve long term glycaemic control. This reduction of random blood glucose level with single bout of exercises using Physioball is innovative, as shown in the above table. Further study involving large sample size, other physical parameters like breathing rate, obesity, lab investigations such as C peptide, inter leukin, triglycerides, osteocalcin, can be given single bout trial using the same technique on normal as well as diabetic subjects.

5. Limitations and Future Recommendations

The same study can be extended for fasting blood sugar, exercises only for upper extremities and only for lower extremities, hence individual based exercises can be decided with which segment of the body to be worked out. As resistance was provided by subjects body weight and therapists manual resistance which are not quantifiable.

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