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Effect of Yoga and Physical Exercises on Metabolic Syndrome Among Persons With Intellectual Disability

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Abstract:

In the context to Intellectual Disability Yoga has gained significant attention in the last decade. There is significant presence of obesity and Metabolic syndrome among children with intellectual Disability. The present research aimed to study the effect of yoga and physical exercises on metabolic syndrome among persons with intellectual disability. **Materials and Methods:** A cross-sectional analysis was done for consecutive subjects who met the diagnosis of syndrome and having the condition of intellectual disability. The subjects were evaluated for the components of Metabolic syndrome as per the International Diabetic Federation (IDF) and National Cholesterol Education Program Adult Treatment Panel-III (NCEP ATP-III). A total of 30 subjects were studied: 10 subjects meeting ICD-10 criteria for metabolic syndrome; equal number of subjects randomly assigned to different two groups for intervention. **Results:** as per the analysis it is found that wait circumference significantly reduced with z value 1.863 ($P<0.06$), t value 2.225 ($P<0.05$). Other medical components of metabolic syndrome are remaining unaffected with the intervention clinically. **Conclusion:** Findings of the study suggest that yoga had a favourable effect on waist circumference of the children with metabolic syndrome. Limitations: present study was a short period study on small number of subjects. To see the more accurate effects of yoga on all components of metabolic syndrome a long term intervention may be replicated.

Introduction:

Metabolic syndrome (MS) comprises of metabolic risk factors including central obesity, glucose intolerance, hyperinsulinemia, low high density cholesterol (HDL-C), high triglycerides (TG) and hypertension. There is good evidence of it contributing to greater risk for type 2 diabetes mellitus and myocardial infarction or cerebrovascular accident. Its increasing prevalence in the developing countries is attributed to the increasing affluence of middle class, urbanization, mechanization, changes in diet, and the sedentary habits.

It has been documented that the physical fitness of adults with intellectual disabilities is less optimal than that of people without intellectual disabilities, Elmahgoub SM, Lambers S, Stegen S, Van Laethem C, Cambier D, et al. (2009). The prevalence of physical inactivity, poor diets, and obesity among people with intellectual disabilities is high , Robertson J, Emerson E, Gregory N, Hatton C, Turner S, et al. (2000) .This may be attributed to their sedentary lifestyle, and associated with their health and mental condition. Temple and Walkley have reported that a low motivation to participate in physical activities, inadequate social support, unclear policies, and a lack of financial support are major factors inhibiting engagement in physical activities by people with intellectual disabilities. Therefore, over time, their level of physical fitness and capacity to exercise will decrease. As a consequence, obesity rates will rise among this population, with resulting increases in the risk of developing diabetes, hypertension,

cardiovascular disease, stroke, and other chronic diseases.

Physical activity has been proven to have a positive influence on physical outcomes and fitness in different populations. The evidence shows that regular physical activity is important to prevent obesity and to reduce the burden of chronic diseases. Moreover, an increasing number of studies have found that physical activity can make people feel good, enhance their sense of self-esteem, have a positive effect on emotional well-being Penedo FJ, Jason R (2005) and Ekeland E, Heian F, Hagen KB, Abbott JM, Nordheirm L (2004), and be a potentially effective strategy for managing depression and anxiety Saxena S, Van Ommeren M, Tang KC, Armstrong TP (2005).

Method:

Present study is a cross sectional experimental study with pre test and post test, intended to see the effect of Yoga and Physical Exercises on MS among children with Intellectual Disability.Present study was conducted at Govt. Rehabilitation Institute for Intellectual Disabilities (GRIID), Sector – 31 (C), Chandigarh, with the prior consent of concerned administrator and the informed consent of parents and persons with Intellectual Disability. Consecutive sample was taken from students attendingGovt. Rehabilitation Institute for Intellectual Disabilities (GRIID) and meeting following inclusionary and exclusionary criteria: Students with moderate Intellectual Disability diagnosed as per ICD 11- Diagnostic Criteria for Research (DCR) and who are attending GRIID including both genders, having the age more than 18 years. Non consenting and students on medication that effect MS (e.g., steroids)will be excluded from the study. Although co morbid conditions of ID like: Cerebral Palsy, Autism and epilepsy will not be included in the present study.

Tool:

For the assessment of MS the National Cholesterol Education Program – Third Adult Treatment Panel (NCEP- ATP III) and International Diabetes Federation (IDF) criteria were preferred. NCEP ATP-III defines MS in men by ≥3 of the following measurements: Waist girth ≥102 cm; TGs ≥1.7 mmol/L, use of fibrates or nicotinic acid; high density lipoprotein (HDL) cholesterol ≤1.03 mmol/L, use of fibrates or nicotinic acid; blood pressure ≥130/85 mm of Hg or use of anti-hypertensive medication; fasting glucose ≥5.6 mmol/L, use of oral hypoglycemic medication or insulin.

International Diabetes Federation (IDF) definition of MS requires central obesity (defined as waist circumference with ethnicity specific values; which for South-Asian men ≥90 cm) and any two of the following factors: TGs ≥150 mg/dL (1.7 mmol/L) or specific treatment for this lipid abnormality, serum HDL-cholesterol <40 mg/dL (1.03 mmol/L) or specific treatment for this lipid abnormality, systolic blood pressure (SBP) ≥130 or diastolic blood pressure (DBP) ≥85 mm of Hg or treatment of previously diagnosed hypertension, fasting plasma glucose (FPG) ≥100 mg/dL (5.6 mmol/L), or previously diagnosed type 2 diabetes. If FPG is above 5.6 mmol/L or 100 mg/dL, oral glucose tolerance test (OGTT) is strongly recommended but is not necessary to define the presence of MS.

Blood Pressure Apparatus: Aneroid sphygmomanometer was used to measure the BP of Samples.Bio Chemical Testing Machine: Standard Bio Chemical Testing machine was used by the expert to do clinical investigations.

Procedure:

In the present study researcher had screened the students initially on the bases of their weight, and waist circumference. Then students who come under the overweight and obese under BMI criteria were listed for the present study. Then researcher had taken the informed consent of parents of listed students regarding the study and on their consent, diagnosis procedure was followed. For the diagnosis, NCEP-ATP –III criteria was followed. Mainly in the present study all five domains had been analyzed to see the effect of both interventions. Initial clinical investigations had been assumed as the pretest for the present study. Then out of the students diagnosed with MS was selected for the intervention and randomly assigned to the both groups.Researcher had given the treatment to the experimental groups for 1 hour daily, from 9:30 to 10:30 AM, for 5 sessions weekly and continued up to 60 sessions regularly. Post intervention clinical investigations were done to see the difference in the scores under different pre-defined domains. Although between the interventions, clinical investigations was repeated for evaluate the progressive effect of the intervention.

Results:

In the present study sample size was very low hence non-parametric analysis had been conducted to make the inference from the collected data. In the domain of waist circumference homogeneity found hence parametric and non- parametric stistics had been used.

Table:1 Comparisons of Pre and Post-test mean Scores in clinical investigations of samples who received Intervention through Yoga (Group 1) – Results of related sample t/z Test:

Domain		**N**	**Mean**	**Std. Deviation**	**t-value, df& p-value**
Waist Circumference	Pre test	5	102.01	8.68907	t'=2.255, z=1.826, df=4, p<0.05 and 0.06
	Post test	5	98.02	7.56307	
Blood Pressure	Pre test	5	133.00	4.47	z=- 2.121, df=4, p<0.03
	Post test	5	122.00	4.47	
HDL	Pre test	5	37.00	5.83	z= 1.826, df=4, p<0.06
	Post test	5	39.00	7.30	
LDL	Pre test	5	37.00	5.83	Z= 1.826, df=4, p<0.06
	Post test	5	39.00	7.80	
Fasting Sugar	Pre test	5	86.80	8.19	Z= -1.214, df=4, p<2.25
	Post test	5	90.00	2.44	
Triglycerides	Pre Test		128.20	42.46	Z=.542, df=4, p<0.588
	Post Test		125.40	52.47	

Table1 depict the Comparisons of Pre and Post-test mean Scores in clinical investigations of samples who received Intervention through Yoga. In the waist circumference of the samples mean difference is 3.99 inches, although t value is also significant at .05% level of significance, which show that there is a significant decrease in the waist circumference among samples who received the intervention through Yoga in the same way difference in the BP, HDL and LDL is also significant with z value 2.121 ($p<0.03$), 1.826 ($P<0.06$) and 1.826 ($p<0.06$) at 0.06 % level.

Z value of Fasting Sugar and triglycerides are 1.214 and .542 respectively. It indicates that there is no significant effect on the Fasting Sugar and triglycerides of samples who received the intervention through yoga.

Table: 2 Comparisons of Pre and Post-test mean Scores in clinical investigations of samples who received Intervention through Physical Exercises (Group 2) – Results of related sample z Test:

Domain		**N**	**Mean**	**Std. Deviation**	**t-value, df& p-value**
Waist Circumference	Pre test	5	104.60	5.31	Z= 1.604, df=4, p<0.109
	Post test	5	102.80	5.16	
Blood Pressure	Pre test	5	132.00	4.47	Z=2.236, df=4, p<0.025
	Post test	5	122.00	4.47	
HDL	Pre test	5	35.80	6.49	Z=2.023, df=4, p<0.043
	Post test	5	32.00	8.03	
LDL	Pre test	5	37.00	5.83	Z=2.023, df=4, p<0.043
	Post test	5	32.00	8.03	
Fasting Sugar	Pre test	5	83.60	17.15	Z=.944, df=4, p<0.345
	Post test	5	89.60	10.21	
Triglycerides	Pre Test		144.20	85.20	Z=1.214, df=4, p<0.225
	Post Test		161.00	94.22	

Table 2 depict the mean and standard deviations of the pre and post test scores of the samples who received the intervention through physical exercises. In the waist circumference of the samples pretest mean score is 104.60 and SD is 5.31, in posttest mean scores are 102.80 and SD is 4.47 which shows a very minimal difference in the pretest and posttest. To see the significance of the difference it is found that z value is 1.604 ($p<0.109$), which show that there is no significant difference in the pretest posttest means scores of waist circumference. In the same way no significant difference found in the pretest posttest mean scores in fasting sugar and triglycerides by z value .944 ($p<0.345$) and 1.214 ($p<0.225$).

There is significant difference found at 0.05% level in BP, HDL, LDL by value 2.236 ($p<0.025$), 2.023 ($p<0.043$) and 2.023 ($p<0.043$)respectively. There is no significant difference in the pretest posttest

mean scores of the fasting sugar and triglycerides by z value .944 ($p<0.345$) and 1.214 ($p<0.225$).

Discussion:

Yoga has a significant effect on the physical activity of the children with intellectual disabilities. In the analysis it if found that there is significant difference in the pretest posttest mean scores of the samples who received the intervention through yoga in waist circumference, BP, HDL and LDL. Other components of the MS i.e. fasting BS and Triglycerides showed no any significant difference in the pretest and posttest mean scores. In the above analysis difference in the various components significant statistically but clinically there is no change in the basic condition of MS except waist circumference domain of yoga group. In the International Diabetes Federation (IDF) definition of MS requires central obesity (defined as waist circumference with ethnicity specific values; which for South-Asian men ≥90 cm) although in the present study mean difference in the waist circumference is +/- 3.99 inches which is statistically significant but over all means score is more than 90, hence condition of MS do not effected with the intervention. In the same way TGs ≥150 mg/dL (1.7 mmol/L) criteria suggested by the IDF but in the present study there is no significant difference found in triglycerides of samples in both the groups.Serum HDL-cholesterol <40 mg/dL (1.03 mmol/L) or specific treatment for this lipid abnormality, HDL differences found significant in the present study in both the groups but this difference is not clinically significant. Systolic blood pressure (SBP) ≥130 or diastolic blood pressure (DBP) ≥85 mm of Hg in the criteria of the IDF, There is significant difference found the in the BP control of the both the groups significantly. The criteria of fasting plasma glucose (FPG) in IDF is ≥100 mg/dL (5.6 mmol/L), or previously diagnosed type 2 diabetes. If FPG is above 5.6 mmol/L or 100 mg/dL, but in the analysis there is no significant difference found in both the groups.

Limitations and Conclusion:

Our study suffered from the following limitations. Thesample was not large. All the samples were schoolattendees. The study sample comprised of both gender,and the MS related factors affecting gender werenot assessed. The definition of diabetes was based on asingle laboratory measurement. Even the sessions in the intervention period are also very less which may affect the clinical results of the study. Dietary habits are not controlled during the study to both the groups and students under medication for comorbid conditions of intellectual disability are not controlled by the researcher. Being the above mentioned limitations it is very difficult to generalize the findings of the study. But in the future it may be suggested that this type of study should be continued for a cohort analysis of the yoga and physical exercises to see its effect on all domains of MS clinically. Finally it is concluded that yoga significantly affect the waist circumference of the samples, who received the intervention through yoga and to see its effect on other domains of MS it should be continued for cohort analysis.

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