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## Study of Cognition in Type 2 Diabetes with Yoga Asana and Pranayama

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### ABSTRACT

Cognition is the process an organism uses to organize the information. Cognition can be used to assess the functional status of the brain. Our main objective of the study is to see the effect of yoga asana and pranayama on cognition in type2 diabetes by using Mini Mental State Examination. The design of our study is Informal experimental design. We have selected 50 type 2 diabetic subjects aged between 35 to 60 years, who are on oral hypoglycemic agents. Subjects are divided in to two groups; control group includes 25 type 2 diabetic subjects who are not having any significant physical activity and examination group includes 25 type 2 diabetic subjects who are doing specific yoga asana and pranayama daily for 30-45 minutes since 1 year. The Mini-Mental State Examination is a widely used, well-validated screening tool for cognitive impairment. It briefly measures orientation to time and place, immediate recall, short-term verbal memory, calculation, language, and construct ability. Each area tested as a designated point value, with the maximum possible score being 30/30. Cognition is significantly more in examination group than the control group. Data was analyzed by using unpaired t- test and P value is <0.05.

**Keywords:** cognition, type 2 diabetes, yoga asana pranayama, mini mental state examination

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## INTRODUCTION

Diabetes is an iceberg disease. Although increase in both the prevalence and incidence of type 2 diabetes have occurred globally, they have been especially dramatic in societies in economic transition, in newly industrialized countries and in developing countries. Currently the number of cases of diabetes worldwide is estimated to be around 150 million. This number is predicted to double by 2025, with the greatest number of cases being expected in China and India [1]. The percentage of diabetic cases residing in urban areas is projected to increase from 54% in 1995 to 73% by 2025[2]. "Although peripheral and autonomic neuropathy is a common complication of DM, the central nervous system (CNS) does not seem to be spared either. In the past few years, CNS involvement in DM has received a special attention, particularly the higher brain functions. The metabolic deregulation influencing cerebral blood flow, metabolism and alteration in higher functions in diabetic patients has been reported and demonstrated at neurochemical, electrophysiological, structural and neurobehavioral levels"[3,4]. Cognitive decline is one among the complications of the uncontrolled diabetes. "Many studies provide compelling evidence to support the view that people with type 2 diabetes are at increased risk of developing cognitive impairment in comparison with the general population"[5]. The Mini-Mental State Examination (MMSE) is a widely used, well-validated screening tool for cognitive impairment. It briefly measures orientation to time and place, immediate recall, short-term verbal memory, calculation, language and construct ability. Each area tested as a designated point value with the maximum possible score on the MMSE being 30/30[6].

Patho-physiology of diabetic peripheral neuropathy includes increased oxidative stress yielding advanced glycosylated end products (AGEs), polyol accumulation, decreased nitric oxide/impaired endothelial function[7], impaired (Na<sup>+</sup>/K<sup>+</sup>)-ATPase activity[8], and homocysteinemia[9]. Not only are nerve cells more likely to be destroyed in a hyperglycemic environment, but repair mechanisms are also defective. Reduced levels of neurotropic agents, including nerve growth factor and insulin like growth factor, have been noted in experimental diabetes [10].

## AIM AND OBJECTIVE

To study the effect of yoga asana and pranayama on cognition in type 2 diabetic patients by assessing MMSE.

### Materials

The study was conducted, after taking informed consent from age and sex matched 50 type 2 diabetic subjects, 25 are controls and 25 are examination group. Examination group are doing yoga asana & pranayama since 1 year.

### *Inclusion criteria*

Both the sexes are included in the study. Minimum educational qualification must be 10<sup>th</sup> standard or above for minimizing the error. Age group from 35-60 years.

**Exclusion criteria**

Those who are suffering with transient ischemic attacks, Alzheimer’s disease, Senile dementia, known cognitive deficit from childhood. Who have undergone recent surgeries and suffering with any major illness, present or past history of head injury. Smokers and alcoholics too are excluded.

**Methodology**

Examination group are doing below mentioned yoga asana and pranayama daily for 30-45 minutes 5 days in a week since 1 year at Yo-cures yoga center, Srinagar colony, Hyderabad. After each pranayama normal breathing has to take before practicing next pranayama (normal breathing for few cycles). Data was collected after taking ethical clearance from the mediciti ethical committee.

**Yoga asana**

The below mentioned yoga asana are selected because they are regulating the blood glucose levels by stimulating the pancreatic endocrine secretions.

Yoga asana		
S.No	Name of the asana	Duration
1.	Dhanurasana	1 minute
2.	Naukasana	1 minute
3.	Arthamasthendrasana	1 minute

**Pranayama**

The below mentioned pranayama will enhance the endocrine secretion of pancreas.

Preparatory pranayama (5 minutes)		
	Hands in and out breathing	
	Hands stretch breathing	
	Ankle stretch breathing	
Various pranayamas which are included in our study		
	Vibhagasvasana(sectional breathing)	
1	Abdominal breathing in chin mudra	2 minutes
2	Thoracic breathing in chinmaya mudra	2 minutes
3	Clavicular breathing in adi mudra	2 minutes
4	Full yogic breathing	2 minutes
5	Kapalbhati	1-2 minutes
4	Anulomaviloma	2-5 minutes
5	Surya anuloma-viloma	5minutes
6	Chandra anuloma-viloma	5 minutes
7	Nadishuddhi pranayama	10 minutes
8	Bhramari	2 minutes
9	Om uccharan	2 minutes

## MMSE

It covers 11 items. Below are the items which it covers with scoring

1. Orientation of time-5
2. Orientation of place-5
3. Registration-3
4. Attention-5
5. Recall-3
6. Naming of items-2
7. Repetition of a phrase followed by-1
8. Verbal-3
9. Written command-1
10. Writing a sentence-1
11. Construction-1

Total score 30

The MMSE is performed by a trained interviewer. MMSE scores will depend on years of education and age. To r/o these factors we have selected the age matched and education qualification of the subjects is minimum of 10 years.

## RESULTS AND DISCUSSION

The mean values of MMSE in control group are 23 and in examination group is 29. Cognitive scores are more in examination group than in control group, the possibility why cognition is more in examination group is yoga asana and pranayama are regulating the functions of CNS by maintaining the normal blood glucose levels more precisely than in control group. Yoga asana and pranayama can improve the cognition by reducing the damage to the central nervous system and this can be achieved by increased peripheral utilization of glucose or by increased secretion of insulin.

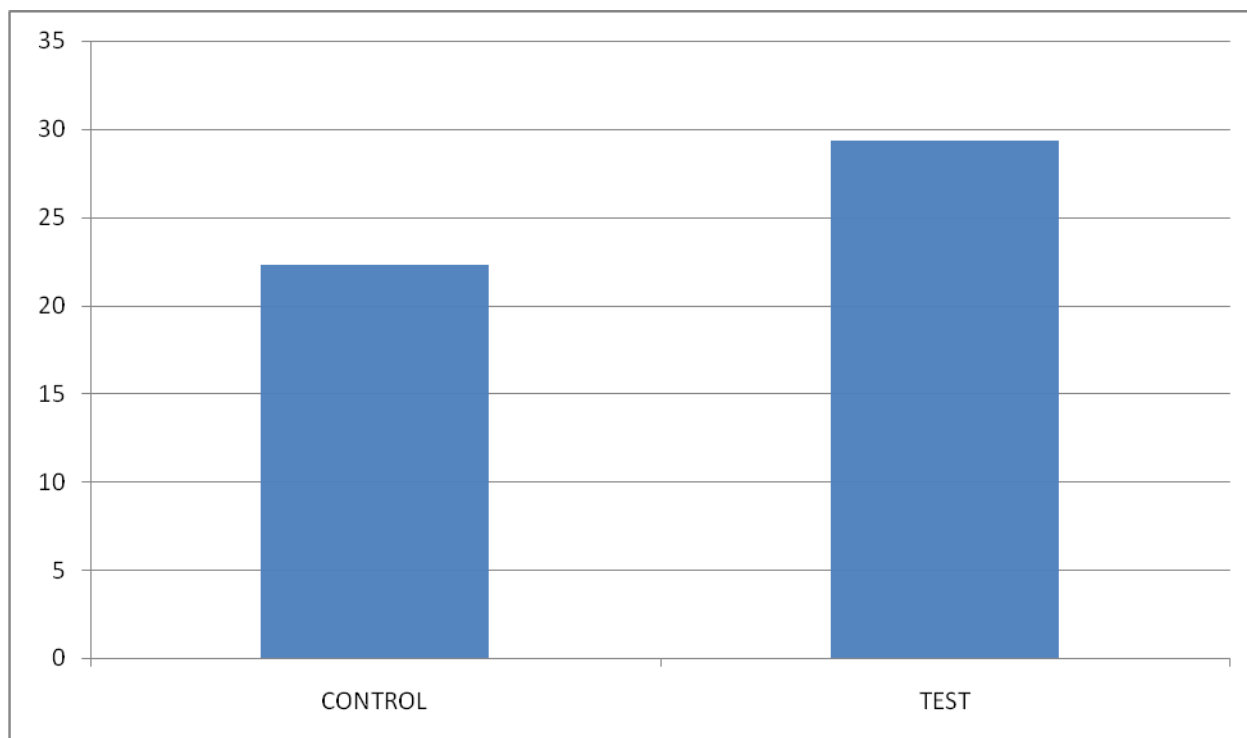
### Limitations of the Study

Dosage, type of drugs, manufactures of the drugs etc. are not considered.

### Future prospects of the study

We are looking forward for more methods in exploring the cognition in type 2 diabetes.

**Graph-1: MMSE scores in control and examination group**



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