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EFFECT OF COGNITIVE BEHAVIOR THERAPY IN ENHANCING MEMORY AMONG MILD HEAD INJURY PERSONS

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,ABSTRACT

Memory is the ability to temporarily store information to manipulate and respond with the answer, in recalling new information or in doing simple calculations. Head-injury is referred to as traumatic brain injury, which is defined as any injury that results in trauma to the skull or brain. Depending upon the level of consciousness and duration of post traumatic amnesia, head-injury is classified as mild, moderate or severe. If the loss of consciousness and disorientation is shorter than 30 minutes, head injury can be classified as a mild.. The aim of the present study is to find out the effect of cognitive behaviour therapy in enhancing memory among mild head-injury persons. Impaired cognitive functions affect the family and occupational life. Once it is identified at an early stage, cognitive behaviour can help to enhance cognitive functions, thereby successful in academic, family and occupational life. The objective of the study is to find out the effect of cognitive behaviour therapy in enhancing memory among mild head-injury persons and find out gender differences, if any, between males and females in enhancing memory through cognitive behaviour therapy. 120 mild head injury persons, Neurosurgeon based on Glasgow Coma Scale scores between 13-15, age ranging from 20 to 30 years, are allotted randomly to control and experimental groups, 60 patients in each group 30 males and 30 females, taking treatment from Multispeciality hospitals, Neuro Centre, around Chennai, The

head injury persons are exposed to Post-graduate Institute Memory Scale. The results show that there is a significant difference (p>.0001) existing in the performance. The experimental group head-injury persons can enhance memory after intervention. Cognitive behaviour therapy has the potential to improve cognitive impairment, which is commonly ignored in mild-head injury persons for a better quality of life. The findings of the study open up new avenues for the future research works in the field of neuropsychological assessment and planning for specific cognitive intervention. Of all the methods, cognitive behaviour therapy is more effective in enhancing memory among mild head-injury persons.

Keywords: Cognitive behaviour therapy, neuropsychological assessment, memory, mild head injury persons, control and experimental group.

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INTRODUCTION

Head-injury is a most common cause of morbidity in India has become a public health concern with recent years (Kraus & Mico, 1997). Head injury is referred to as traumatic brain injury, which is defined as any injury that results trauma to the skull or brain (Mc Caffey, 1997). Depending upon the level of consciousness and duration of post traumatic amnesia, head injury is classified as mild, moderate or severe (Kohler, et al., 2012). If the loss of consciousness and disorientation is shorter than 30 minutes, head-injury can be classified as a mild. Cognitive impairment following moderate to severe head-injury does not recover to baseline even after two years of the injury. However, it is found that in mild head injury recovery of cognitive deficit is rapid (Varshanavi,et al., 2009). The effect of a mild head- injury will be traumatic on the injured person's life and the family (Saatman, et al., 2008). Long term rehabilitation is beneficial in improving everyday functions and independence. Causes of mild head-injury can also have a serious impact on family, job, social and community integration is unaddressed. Cognitive behaviour therapy will be used in the management of neuropsychological problems among mild head-injury persons in the present study.

Neuropsychology is a sub-speciality in cognitive neuroscience that deals with the structure and functions of the brain. Neuropsychology is a sub-speciality in clinical psychology, studying the relationship between the structure and function of the brain like thinking, memory, attention and concentration, language perception, problem - solving, decision - making, reasoning and overall behaviour of the individual (Walsh, 1999).

Neuropsychological assessment is very important for planning intervention. Neurological assessment focuses on assessing the mental status of the individual and proves to be scientific. These tests are designed to evaluate sensory processing, language, spatial awareness and motor coordination (Gregory, 2000). It is a diagnostic tool in planning cognitive rehabilitation. Cognitive rehabilitation aims to address not only cognitive impairment but also associated social, emotional and behavioural problems of the injury. Neuropsychological assessment is the precursor to effective neuro-rehabilitation. It provides objective information on the nature and extent of damage and helps in deciding on cognitive behaviour therapy

Several studies report cognitive impairment after head- injury. Brooks, et al., (1999) and Mcdowell, et al., (1987) report the impairment of executive functions in patients with mild head- injury. Computer assisted training improves attention, memory and executive states (Mclnnes, 2017). Biofeedback facilitates enhancing attention and concentration (Mukundan, 1999). Twarmlet, et al., (2015) have developed Cognitive Symptom Management and Rehabilitation Therapy effective in improving the quality of life of individuals with mild head- injury. Cognitive management improves working memory. Ideational fluency, verbal and visual memory, abstraction and information processing (Wilson & Gilsky, 2009). Hence, cognitive behaviour therapy is used for the management of neuropsychological problems among mild head- injury persons in the present study.

Its been reported that 80-100% mild head-injury persons develop symptoms such as headache, slowed thinking, impaired attention and memory (Mcmillan & Hebert, 2004). About 40% of the people with mild head-injury have persistent symptoms 3 to 6 months after post injury (McCullah, et al., 2001). Several studies

report cognitive deficits after mild head-injury. Attention deficits in executing dual tasks and working memory in patients with mild head-injury (Cicerone, Brooks & Cllleagues (1999), Mcdowell et al., (1997).

Cognitive behavioural therapy is a treatment that helps people to learn how to identify and change destructive or disturbing thought patterns, which have a negative influence on behaviour and emotions. Cognitive behaviour therapy focuses on changing the automatic negative thoughts that can contribute to and worsen emotional difficulties, cognitive functions, depression and anxiety. Review of worldwide literature reveals that cognitive behaviour therapy is more useful in the management of neuropsychological problems (Vanderploeg, et al., 2018; Cooper et al., 2017, McInnes et al., 2017, Berger, et al., 2016, Radomski, et al., 2016, Sivak, etr al., 2016, Potte, et al., 2016, Theadom, et al., 2016; Massey, et al., 2015, Walter et al., 2015, Twarmley, et al., 2014, Twqnley, et al., 2014, Kohler, et al., 2012, Shailejha, et al., 2009; Tsaousdes & Gordon, 2009, Bayley, et al., 2005, Pershad & Verma, 1990 and Wilson (2008).

PURPOSE OF THE STUDY

The aim of the study is to find out the effectiveness of cognitive behaviour therapy in enhancing memory among mild head- injury persons. Neuropsychological problems impair performance in the family and workplace. Once it is identified at an early stage, mild head- injury persons can be helped to overcome the neuropsychological problems and successful in personal and occupational life.. The main objective is to find out the effectiveness of cognitive behaviour therapy in memory among mild head injury persons and to find out gender differences, if any, among men and women in enhancing memory through cognitive behaviour therapy.

HYPOTHESIS

Based on the review of literature, the following hypotheses are made :

(Ha1) Cognitive Behaviour Therapy is effective in enhancing memory among mild head- injury persons

(Ha2) Males are better than females in enhancing memory after intervention.

TOOL FOR TESTING

Assessment of memory includes both verbal and nonverbal/ visual memory and analyse if there are any impairments. There can be impairment in a specific areas of memory, for example, retrieval of information can be affected than the encoding. Assessment of memory can help in locating the area of deficit in memory and planning an appropriate strategy specific to the impairment to improve the impaired functions. Mild head-injury persons will be administered tests, such as

- Glasgow Coma Scale
- Post-graduate battery of Brain Dysfunctions - Post-graduate Institute Memory Scale

Short description of the tests is given below:

Glasgow Coma Scale - Teasdale & Jennett (1974) have developed the Glasgow Coma Scale. Neurosurgeons use this 5 - Point scale to diagnose severity of the traumatic brain injury based on the affected person's social functioning and dependency. The types of disability are classified based in the scores as mild, moderate and severe.

SCORING:

Mild (13-15) - if the loss of consciousness is less than 30 minutes, , head injury is categorized as mild. The impairment resolves within first 3 months.

Moderate disability (9-12) - if the loss of consciousness is greater than 30 minutes, head injury is categorized as moderate. The impairment may or may not resolve. They benefit well from rehabilitation.

Severe disability (3-8) - in severe category, head injured person is usually in coma or unconscious state with no meaningful response or voluntary activities.

Vegetative state (less than 3) - in vegetative state , the injured person does not _show any localized response to pain or any interaction with the environment.

Persistent Vegetative state - in this state, the person remains in in vegetative state longer than one month

Brain death- this is certified by Neurologist/Neurosurgeon with specific diagnostic criteria. No brain function.

Post-graduate Institute Memory Scale - Dwraka Pershad & Santhosh K Verma (1988) have developed the Post-graduate Institute Memory Scale to evaluate the extent of decline or loss in the cognitive area as a result of illness, accident, injury and natural calamities to plan rehabilitation strategy, training and treatment. for the evaluation of outcome of the treatment and help the judiciary in taking decisions about the extent of decline for grant of compensation. Memory is the ability to retain and reproduce impressions once perceived intentionally. Memory is the function of the temporal lobe of the cerebral cortex - right temporal lobe is responsible for non-verbal and the left temporal lobe for the verbal part of the memory. Memory tests consist of 10 subtests such as Remote Memory, Recent Memory, Mental Balance, Attention and Concentration, Delayed Recall and Immediate Recall, (Sentence reproduction), Verbal Retention of Similar Pairs, Verbal Retention of Dissimilar Pairs, Visual Retention and Recognition. Test -retest reliability ranges from .69 to .85.

SCORING: Standard scoring procedure is adopted.

SAMPLING DESIGN

120 mild head injury persons, Neurosurgeon based on Glasgow Coma Scale scores between 13-15, age ranging from 20 to 30 years, admitted in the Emergency Unit of Department of Neurosurgery in a private hospital, Chennai. They are a exposed to Brain Dysfunctions - Post-graduate Institute Memory Scale. 120 mild head- injury persons are allotted randomly to control and experimental groups, 60 mild head- injury persons in each group, 30 males and 30 females, for the final study (Table 1).

Table 1

Sample Characteristics (N=120)

PARAMETERS	MALES	FEMALES
Control group	30	30
Experimental group	30	30

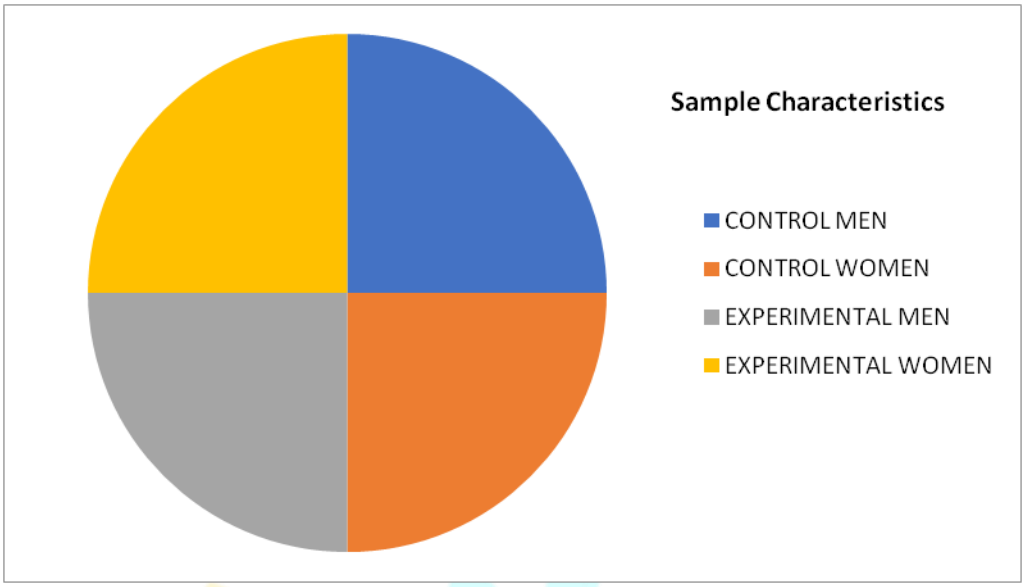

Figure 1: *Sample Characteristics*

RESEARCH DESIGN

This research is an experimental research. This study involves matched group research design principles for testing the hypothesis**.** The area of study for the experimental intervention is Neurocentre, Multispeciality hospitals, Chennai. For matching the group in experimental design, Glasgow Coma Scale is used to asses the intensity and severity of neuropsychological problems among head- injury persons. The research is carried out in three phases. In phase one, preliminary formalities and administration of tests are done. In the second phase, intervention in the form of cognitive behaviour therapy is conducted. In the third phase, post test, i.e., 6 months after cognitive behaviour therapy and follow up, i.e., one year after follow up are taken care-off.

STATISTICS

The data are analysed through Statistical Package for Social Sciences 21 Version, to test the hypotheses and draw the conclusions in the present study.

RESULTS AND DISCUSSION

The findings of the present study are discussed in tables 2 and Figures 2 and 3

Table 2

Mean and Sd scores Post Graduate Institute Memory subscales scores of control Vs. experimental group (n=120) over three phases of training

SUBTEST	CATEGORY	MEAN	Sd	't' - VALUE	P - VALUE
Remote memory - Pre test	Control group Experimental group	5.24 5.2	0.640. 54	0.000	NS
Post test	Control group Experimental group	5.24 6.34	0.64 0.58	13.4523	p>.0001
Follow up	Control group Experimental group	5.24 6.84	0.64 0.54	14.8004	p>.0001
Recent Memory- Pretest	Control group Experimental group	5.00 5.00	0.62 0.34	0.0000	NS
Posttest	Control group Experimental group	5.00 7.00	0.62 0.38	21.3039	p>.0001
Follow - up	Control group Experimental group	5.00 7.20	0.62 0.42	22.7559	p>.0001
Mental balance- Pretest	Control group Experimental group	6.8 6.8	0.99 0.89	0.0000	NS
Posttest	Control group Experimental group	6.8 9.0	0.99 1.38	11.8581	p>.0001
Follow - up	Control group Experimental group	6.8 9.4	0.99 0.48	15.8342	p>.0001
Attention & Concentration- Pretest	Control group Experimental group	9.2 9.2 9.2	0.84 0.63	0.0000	NS
Posttest	Control group Experimental group	12.8 9.2	0.84 1.34	24.9355	p>.0001
Follow - up	Control group Experimental group	13.4	0.84 0.32	26.7832 2	p>.0001
Delayed recall - Pretest	Control group Experimental group	8.06 8.00	1.20 0.84	0.0000	NS
Posttest	Control group Experimental group	8.06 13.40	1.20 0.98	28.1118	p>.0001
Follow-up	Control group	8.06	1.2	30.9765	p>.0001

	Experimental group	9.14	o.97		
Immediate recall - Pretest	Control group Experimental group	8.21 8.21	1.12 1.05	0.0000	p>.0001
Posttest	Control group Experimental group	8.21 11.97	1.12 0.98	17.8331	p>.0001
Follow - up	Control group Experimental group	8.21 12.34	1.12 2.9	19.5647	p>.0001
Verbal retention for dissimilar pairs - Pretest	Control group Experimental group	6.86 6.86	1.23 0.98	0.0000	NS
Posttest	Control group Experimental group	6.86 10.9	1.23 0.75	30.8371	p>.0001
Follow - up	Control group Experimental group	6.86. 11.4	1.23 0.76	34.6002	p>.0001
Visual retention- Pretest	Control group Experimental group	8.12 8.12	1.45 0.98	0.000	NS
Posttest	Control group Experimental group	8.12 10.47	1.45 0.78	15.6351	p>.0001
Follow - up	Control group Experimental group	8.12 12.35	1.25.1 .05	17.346	p>.0001
Visual recognition - Pretest	Control group Experimental group	8.42 8.42	1.16 0.98	0.000	NS
Posttest	Control group Experimental group	8.42 10.75	1.16 1.83	36.7056	p>.0001
Follow – up	Control group Experimental group	8.42 12.42	1.160. 87	38.2845	p>.0001

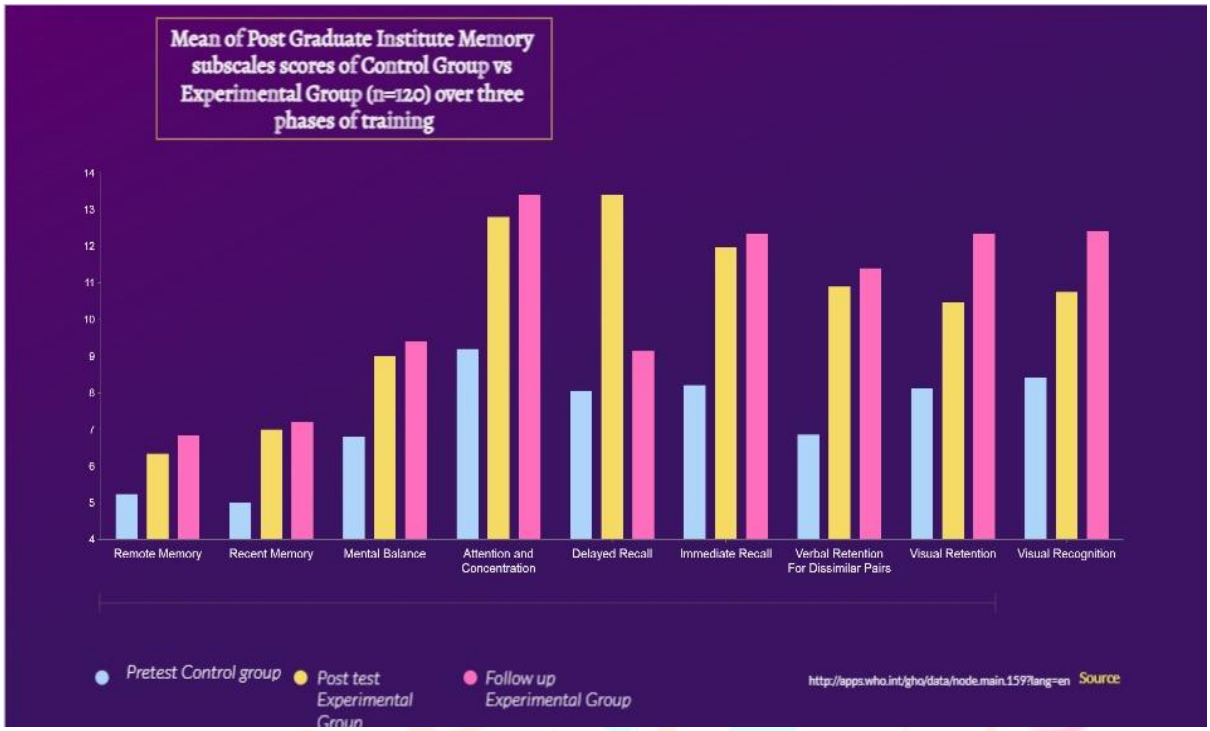

Fig 2: *Mean Post Gradate Institute Memory - memory subscales scores of control Vs. experimental group over three phases of training*

Tables 2 and Figures 2 Bar diagram show Mean, Sd and level of significance on Post Graduate Institute Memory Scale and its subscales scores of control Vs. experimental group over phases of training. Results clearly indicate that there is no significant difference existing in all the memory tests before the intervention, hence, sample selected for the study is a homogeneous sample.

Posttest and follow-up show that there is a significant difference existing in the performance in almost all the domains of the memory. Experimental group is better than th6e control group in all the subscales of memory.

Hypothesis (Ha) stating "Cognitive Behaviour Therapy is effective in enhancing memory among mild head-injury persons" is accepted. In fact, Cognitive behaviour therapy is useful in enhancing memory functions among experimental group. The findings of the present study is corroborated with the research findings of Vanderploeg, et al., (2018); Cooper et al., (2017), McInnes et al., (2017), Berger, et al., (2016), Radomski, et al., (2016), Sivak, etr al., (2016), Potte, et al., (2016), Theadom, et al., (2016); Massey, et al., (2015), Walter et al., 2015, Twarmley, et al., (2014), Twqnley, et al., (2014), Kohler, et al., (2012), Shailejha, et al., (2009); Tsaousdes & Gordon, (2009), Bayley, et al., (2005), Pershad & Verma, (1990) and Wilson (2008)..

The results of the present study is tenable with the findings of Massey, et al., (2015).

They report that post traumatic stress disorder. Depression and pain is found to impair working memory, memory, selective attention, processing speed, reaction time and verbal fluency.

The results of the present study is corroborated with the research findings of Shailaja, et al., (1990). They said that adequate attention improves encoding and retrieval of stored information which is required in day-to-day life to present accidents. Improved attention enhances speed and accuracy on recognition of tasks. An individual has to be attentive moving around a building, walking or driving.

Twamley et al,, (2014) has delineated the fact that cognitive behaviour therapy reduces symptoms like headache, fatigue, irritability and sleep problems and improves attention and concentration, memory and executive functions used in the day-to-day life activities. Head-injury persons learned how to apply the concepts acquired during the session in the place of deployed.

Dwarakesh & Verma (1990) point out that memory areas such as recent memory, remote memory, mental balance, attention and concentration, delayed recall, immediate recall, Verbal retention - similar pair and dissimilar pair, visual retention and recognition are used in day-today life activities, occupations and social interactions in encoding, storing and retrieving the information as and when required.

COMPARISION OF GENDER DIFFERENCES

Table 3 and Figure 3 Bar Diagram show gender differences, between males and females.

Table 3

Mean and Sd scores Post Graduate Institute Memory subscales scores of control males Vs. experimental females group (n=120) over three phases of training.

SUBTESTS	CATEGORY	MEAN	Sd	't' - VALUE	P - VALUE
Remote memory - Pretest	Control group males Experimental group females	5.2 5.2	0.640.54	0.000	NS
Posttest	Control group males Experimental group females	5.24 6.34	0.64 0.58	13.4523	p>.0001
Follow up	Control group males Experimental group females	5.24 6.84	0.64 0.54	14.8004	p>.0001
Recent Memory- Pretest	Control group males Experimental group females	5.00 5.00	0.62 0.34	0.0000	NS
Posttest	Control group males Experimental group females	5.00 7.00	0.62 0.38	21.3039	p>.0001
Follow - up	Control group males Experimental group females	5.00 7.20	0.62 0.42	22.7559	p>.0001
Mental balance- Pretest	Control group males Experimental group females	6.8 6.8	0.99 0.89	0.0000	NS
Posttest	Control group males Experimental group females	6.8 9.0	0.99 1.38	11.8581	p>.0001
Follow - up	Control group males Experimental group females	6.8 9.4	0.99 0.48	15.8342	p>.0001
Attention & Concentration- Pretest	Control group males Experimental group females	9.2 9.2	0.84 0.63	0.0000	NS
Posttest	Control group males Experimental group females	9.2 12.8	0.84 1.34	24.9355	p>.0001
Follow - up	Control group males Experimental group females	9.2 13.4	0.84 0.32	26.7832 2	p>.0001

Delayed recall - Pretest	Control group males	8.06	1.20	0.0000	NS
	Experimental group females	8.00	0.84		
Posttest	Control group males	8.06	1.20	28.1118	p>.0001
	Experimental group females	13.40	0.98		
Follow-up	Control group males	8.06	1.2	30.4358	p>.0001
	Experimental group females	9.14	0..97		
Immediate recall - Pretest	Control group males	8.21	1.12	0.0000	p>.0001
	Experimental group females	8.21	1.05		
Posttest	Control group males	8.21	1.12	17.8331	p>.0001
	Experimental group females	11.97	0.98		
Follow - up	Control group males	8.21	1.12	19.5647	p>.0001
	Experimental group females	12.34	2.9		
Verbal retention for dissimilar pairs - Pretest	Control group males	6.86	1.23	0.0000	NS
	Experimental group females	6.86	0.98		
Posttest	Control group males	6.86	1.23	30.8371	p>.0001
	Experimental group females	10.9	0.75		
Follow - up	Control group males	6.86.	1.23	34.6002	p>.0001
	Experimental group females	11.4	0.76		
Visual retention- Pretest	Control group males	8.12	1.45	0.000	NS
	Experimental group females	8.12	0.98		
Posttest	Control group males	8.12	1.45	15.6351	p>.0001
	Experimental group females	10.47	0.78		
Follow - up	Control group males	8.12	1.25.1	17.346	p>.0001
	Experimental group females	12.35	.05		
Visual recognition - Pretest	Control group males	8.42	1.16	0.000	NS
	Experimental group females	8.42	0.98		
Posttest	Control group males	8.42	1.16	36.7056	p>.0001
	Experimental group females	10.75	1.83		
Follow - up	Control group males	8.42	1.160.	38.2845	p>.0001
	Experimental group females	12.42	87		

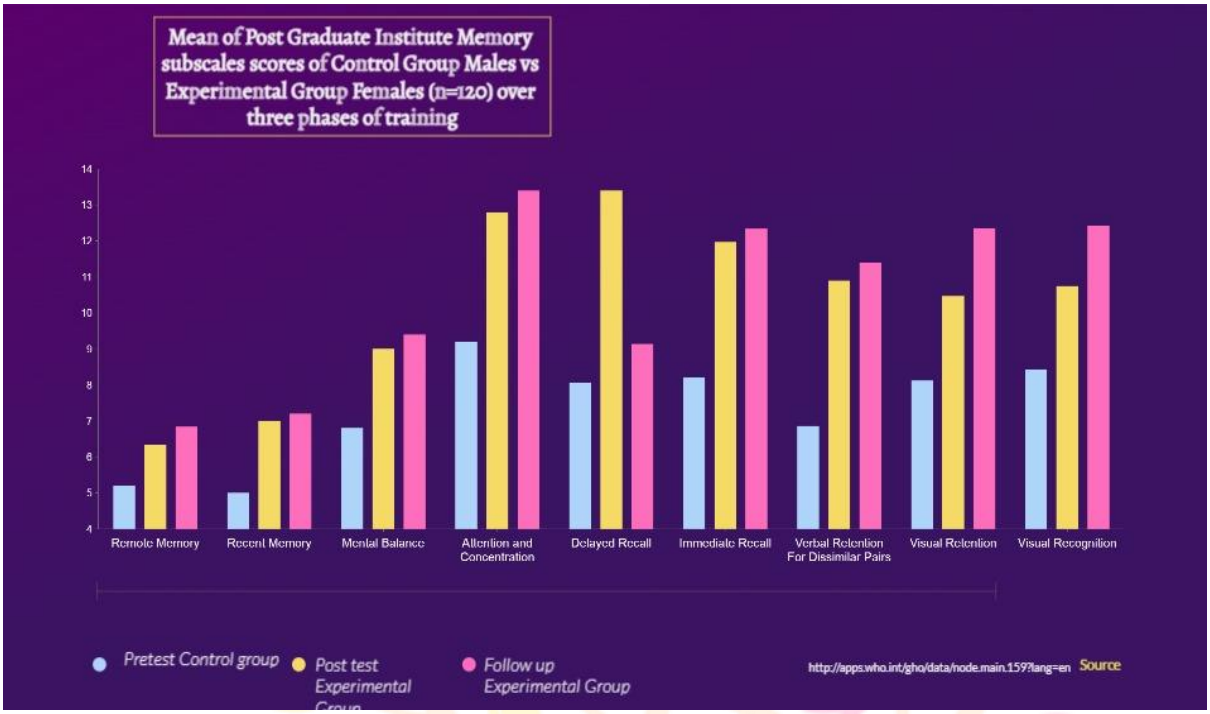

Figure 3: *Mean Post Gradate Institute Memory - memory subscales scores of control males Vs. experimental group females over three phases of training*

Tables 3 and Figures 3 Bar diagram show Mean, Sd and level of significance on Post Graduate Institute Memory Scale and its subscales scores of control males Vs. experimental group females over phases of training. Results clearly indicate that there is no significant difference existing in all the memory tests before the intervention, hence, sample selected for the study is a homogeneous sample.

Posttest and follow-up show that there is a significant difference existing in the performance in almost all the domains of the memory. Experimental group males are better than experimental group females in all the subscales of memory.

Hypothesis (Ha) stating "Males are better than females in enhancing memory through cognitive behaviour therapy among mild head- injury persons" is accepted. In fact, Cognitive behaviour therapy is useful in enhancing memory functions among experimental group males.

SUMMARY AND CONCLUSIONS

This study is intended to explore the extent to techniques, multi prolonged cognitive intervention, using cognitive behaviour therapy, comprising of rehabilitation management which includes relaxation and mental imagery to improve memory, to facilitate mild head-injury persons to improve their impaired cognitive functions and enhance their wellbeing through enabling improvement in day-to-day activities and occupation.

It is concluded that

- Cognitive behaviour therapy is effective in enhancing memory among mild head- injury persons
- Males are faster females in enhancing memory after intervention

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