

# Cognitive Impairment and Post Traumatic Stress Disorder among Firefighters

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**Abstract:-** In times of crisis and imminent danger or hazard when the most common response is to run away, there are men and women whose job it is to run towards the danger to serve and protect their community. Firefighters are one among those professionals who endanger their lives in their aspiration of saving lives, property, and the environment. The present study aims understand the factors that contribute to cognitive impairment and PTSD. The sample for the present study consists of twenty each of field working, office working and both field and office working firefighters. The firefighters are selected from Fire and Rescue Departments in Angamaly and Aluva in Ernakulam district of Kerala state. Permission were obtained personally from concerned authorities of Fire and Rescue Departments. Tools such as a Montreal Cognitive Assessment (MoCA) and Posttraumatic Stress Scale – Interview version for DSM-5 (PSSI-5) were used. Obtained data were analyzed using statistical techniques like Student's t-test, One way ANOVA and Post-hoc comparison (Scheffe's test). The study revealed that both field and office working firefighters had significant cognitive impairment than only office working firefighters. Results also showed significant differences in PTSD for field and both field and office working firefighters compared to office working firefighters. There were also significant differences based on age, marital status and years of experiences on both cognitive impairment and PTSD.

**Keywords:-** Cognitive impairment, Post Traumatic Stress disorder, Firefighters.

## I. INTRODUCTION

Firefighters are seen as a inimitable sort as they not only have to deal with the same issues as society in general, but also the fact that they are exposed to events that involve trauma, death and loss on a regular basis throughout their career. When an emergency occurs, there is a probability that someone would respond to mitigate the emergency rather than moving away. The most expected at these times are presence of firefighters running around with help.

Firefighting remains a hazardous occupation, where unlike in most other jobs, the primary function is one of hazard engagement complicated by extreme time pressure [1], a likelihood of experiencing elevated stress levels, a high degree of task and environment uncertainty, and the continuous emergence of novel events [2].

The role of the firefighter in the modern fire and rescue service has become increasingly diverse. In addition to responding to fire-related emergencies and reducing the number of deaths, injuries, and property damage caused by fire, the firefighter must also engage in emergency planning and response to accidents. These incidents are also likely to encompass road, rail and air crashes; coastal pollution; severe floods; terrorist attacks; chemical, biological and radiological incidents. The present study focuses on cognitive impairment and post traumatic stress disorder in firefighters.

Cognitive impairment is when problems occur with thought processes. This problem in thought process includes higher reasoning deficits, forgetfulness, disabilities in learning, and difficulties in concentrating, decreased intelligence, and all other reductions in mental functions.

Hans Selye (1956) [3] conceptualised stress a consistent pattern of mind-body reactions and also wear and tear on the body as a response to a demand placed upon it. According to the American Psychiatric Association (2000) [4], the rate of posttraumatic stress increases substantially due to the expectations connected with high-risk occupations. This rate is relatively low for the general population and most careers. However, the professions within emergency services or combat veterans as identified to have an increased risk of developing symptoms for post traumatic stress due to the precariousness of their job.

PTSD is one kind of a disorder most firefighters suffer from but have never been clinically diagnosed.

The present study is oriented to explore the factors that contribute or elevate the cognitive impairment and post traumatic stress disorder of fireman. The purpose of this piece of research is to build an understanding of the difficulties experienced by firefighters.

The major objectives of the study were to find out whether there are significant differences in cognitive impairment and post traumatic stress disorder among firefighters based on nature of work (working in field and working in office and working in both office and field). Other socio-demographic factors like age, marital status and years of experience are considered as secondary objective.

## II. METHODOLOGY

Purposive sampling techniques were employed for selecting the sample. Data were collected using scales having well established psychometric properties.

The sample for the present study consists of twenty each of fields working firefighters and office working firefighters and both office and field working firefighters. The firefighters are selected from Fire and Rescue Departments in Angamaly and Aluva in Ernakulam district of Kerala state. The break-up of the sample is given in table 1

Sample	Field working	Office working	Both (field and office working)	Total
Sample size	20	20	20	60

Table 1:- Break-up of sample

Questionnaire method was used in the present study. Two main measures were used:

- Montreal Cognitive Assessment (MoCA)- Dr. Ziad Nasreddine [5]
- Posttraumatic Stress Scale – Interview version for DSM-5 (PSSI-5) - Elizabeth A. Hembree, Edna B. Foa, & Norah C. Feeny [6]

In addition, a personal data questionnaire is used to collect information on relevant socio-demographic variables such as age, marital status, nature of work, years of experience, and the like.

In analyzing the data statistical procedures such as mean, and standard deviation (S.D), ANOVA were conducted. The mean scores obtained by the different groups (transgender/male/female) in the different variables coming under the three measures were computed and the significance of the mean differences were tested using one way ANOVA where there were more than two groups. For significant F-values, further multiple comparisons were done using Scheffe’s post hoc test.

## III. RESULT & DISCUSSION

The main objective of the present study was to examine the cognitive impairment and post traumatic stress

disorder among firefighters. The study also intended to find out whether there are significant differences in their cognitive impairment and post traumatic stress disorder in connection with age, years of experience etc.

The obtained data were consolidated, coded and subjected to different statistical analyses such as mean and standard deviation, one-way ANOVA and Scheffe's Post hoc test, The results obtained are reported and discussed below under the following sections.

### ➤ Analysis of hypotheses

The hypothesis is tested under this section. There are 12 hypotheses and hypothesis having two variable is tested using t test and more than two variables are tested using ANOVA is used.

### A. HYPOTHESIS I

The first objective of the study hypothesized as “There will be significant difference in cognitive impairment among firefighters based on nature of work (working in field, office and both field and office).”

ANOVA was employed to test significant difference in cognitive impairment among firefighters based on nature of work (working in field, office and both field and office). Table 2 presents the results of the comparison

VARIABLE	SOURCE	SUM OF SQUARES	DF	MEAN SQUARE	F
COGNITIVE IMPAIRMENT	BETWEEN GROUP	113.23	2	56.61	5.93**
	WITH GROUP	544.50	57	9.55	
	TOTAL	357.73	59		

\*\*significant at .01 level

Table 2:- Summary of ANOVA of cognitive impairment and nature of work among firefighters

VARIABLE	NATURE OF WORK	MEAN	N	SD
COGNITIVE IMPAIRMENT	FIELD	26.55	20	3.05
	OFFICE	28.50	20	2.28
	BOTH	25.15	20	3.76
	TOTAL	26.73	60	3.34

Table 3:- Mean and standard deviation of firefighters based on cognitive impairment

A significant result was obtained in the one-ANOVA test, in which  $F= 5.93$ (significant at .05 level) and it indicates that there are significant difference among nature of work of firefighters and cognitive impairment. The present hypothesis tested is the cognitive impairment and nature of work of firefighters. The F ratio obtained in the analysis was 5.93 which is significant. This means that cognitive impairment of the three group of nature of work

ie firefighters working in field, firefighters working in office and firefighters working in both field and office is significantly different. The result is presented in table.2 Since analysis of variance does not show which pair of groups show significant difference, further analysis was carried out using Shaffee Test. the result are presented in table 4

VARIABLE	THREE GROUPS	THREE GROUPS	MEAN DIFFERENCE
COGNITIVE IMPAIRMENT	FIELD	OFFICE	-1.95
		BOTH	1.40
	OFFICE	FIELD	1.95
		BOTH	3.35*
BOTH	FIELD	-1.40	
	OFFICE	-3.35	

\* significant at .05 level

Table 4:- Results of Scheffe Procedure for cognitive impairment of firefighters based on three groups of nature of work (field, office and both field and office)

The results given in table 4 indicates that cognitive impairment of office working firefighters and both office and field working firefighters are significantly different. In cognitive impairment the mean values obtained by office working and both field and office working firefighters with field working firefighters is compared but have no significant difference. The mean difference being -1.95 for office working group and 1.40 for both office and field working group. In cognitive impairment the mean values obtained by field working and both field and office working firefighters with field working firefighters is compared and both field and office working firefighters found to have significant difference but field working firefighters found to have no significant difference. The mean difference being 1.95 for field working group and 3.35 for both office and field working group. The result indicate that cognitive impairment of both office and field working firefighters is significantly different for office working firefighters but not significant for field working firefighters. The mean difference being -1.40 for field working firefighters and -3.35 for office working firefighters respectively.

The highest mean score in cognitive impairment is 28.50 for office working firefighters and lowest score of 25.15 for both office and field working firefighters. The highest mean score indicate low cognitive impairment and lowest mean score indicate high cognitive impairment. The high cognitive impairment in office and field working firefighters than field and office working firefighters may

be due to multiple responsibly and the higher amount of stress to be faced as a firefighters. Firefighters who are engaged in office work has only to so paper works, attend phone calls etc but firefighters who had to do both field and office work has to do both the work like attending calls, working in emergency situation and also has to take immense stress and has to face the blackouts in traumatic situations too this create impairments in their memory.

A study conducted by Robinson, S. L., & Morrison, E. W. (2000) [7], found that cognitive impairments were found following a simulated emergency and could explain maladaptive responses observed during real fires. Moreover, the results suggest the type of cognitive impairments observed may be time dependent, with different cognitive difficulties becoming evident at different times following an emergency.

**B. HYPOTHESIS II**

The second objective of the study hypothesized as “There will be significant difference in post traumatic stress disorder among firefighters based on nature of work(working in field, office and both field and office).”

ANOVA was employed to test significant difference in post traumatic stress disorder among firefighters based on nature of work(working in field, office and both field and office). Table 5 presents the results of the comparison

VARIABLE	SOURCE	SUM OF SQUARES	DF	MEAN SQUARE	F
POST TRAUMATIC STRESS DISORDER	BETWEEN GROUP	2575.03	2	1287.51	10.71**
	WITH GROUP	6851.15	57	120.19	
	TOTAL	9426.18	59		

among firefighters

\*\*significant at .01 level

Table 5:- Summary of ANOVA of post traumatic stress disorder and nature of work

VARIABLE	NATURE OF WORK	MEAN	N	SD
POST TRAUMATIC STRESS DISORDER	FIELD	19.35	20	14.37
	OFFICE	3.40	20	4.17
	BOTH	12.90	20	11.69
	TOTAL	11.88	60	12.64

Table 6:- Mean and standard deviation of firefighters based on post traumatic stress disorder

A significant result was obtained in the one-ANOVA test, in which  $F = 10.71$  (significant at .01 level) and it indicates that there are significant difference among nature of work of firefighters and post traumatic stress disorder. The present hypothesis tested is the post traumatic stress disorder and nature of work of firefighters. The F ratio obtained in the analysis was 10.71 which is significant. This means that post traumatic stress disorder of the three

group of nature of work i.e. firefighters working in field, firefighters working in office and firefighters working in both field and office is significantly different. The result is presented in table 5 Since analysis of variance does not show which pair of groups show significant difference, further analysis was carried out using Shaffee Test. the result are presented in table.7

VARIABLE	THREE GROUPS	THREE GROUPS	MEAN DIFFERENCE
POST TRAUMATIC STRESS DISORDER	FIELD	OFFICE	15.95*
		BOTH	6.45
	OFFICE	FIELD	-15.95*
		BOTH	-9.50*
	BOTH	FIELD	-6.45
		OFFICE	9.50*

\* significant at .05 level

Table 7:- Results of Scheffe Procedure for post traumatic stress disorder of firefighters based on three groups of nature of work(field, office and both field and office)

The results given in table 7 indicates that post traumatic stress disorder of office working firefighters and both office and field working firefighters are significantly different. In post traumatic stress disorder the mean values obtained by office working firefighters with field working firefighters is compared but have significant difference but with both field and office working firefighters have no significant difference. The mean difference being 15.95 for office working group and 6.45 for both office and field working group. In post traumatic stress disorder the mean values obtained by field working and both field and office working firefighters with field working firefighters is compared and both found to have significant difference. The mean difference being -15.95 for field working group and -9.50 for both office and field working group. The result indicate that post traumatic stress disorder of both office and field working firefighters is significantly different for office working firefighters but not significant for field working firefighters. The mean difference being -6.45 for field working firefighters and 9.50 for office working firefighters respectively. The significant differences in post traumatic stress disorder for field and both field and office working firefighters have significant difference with office working firefighters this may be due

to the fact that the office working firefighters are less related to outside works like firefighting, getting people out of emergency situation etc than the other two groups.

According to the American Psychiatric Association [4], the rate of post-traumatic stress disorder (PTSD) in the general population ranges from seven percent to nine percent. When a firefighter is exposed to a traumatic incident, there is the possibility that the firefighter will experience significant psychological distress. Various research studies pertaining specifically to firefighters have cited PTSD rates for firefighters ranging from 16 percent to as high as 24 percent. PTSD symptoms may even force some firefighters into retirement. Thus the APA says that exposure to traumatic incidents can cause PTSD.

**C. HYPOTHESIS III**

The third objective of the study hypothesized as “There will be significant difference in cognitive impairment among firefighters on the basis of their age.” ANOVA was employed to test significant difference in cognitive impairment among firefighters based on their age. Table 8 presents the results of the comparison

VARIABLE	SOURCE	SUM OF SQUARES	DF	MEAN SQUARE	F
COGNITIVE IMPAIRMENT	BETWEEN GROUP	98.83	2	49.41	5.04*
	WITH GROUP	558.90	57	9.80	
	TOTAL	657.73	59		

\*significant at .05 level

Table 8:- Summary of ANOVA of cognitive impairment and age among firefighters

Variable	Age	Mean	N	SD
Cognitive impairment	25-35	28.67	18	1.94
	36-45	26.12	24	3.07
	46 and above	25.61	18	4.04
	Total	26.73	60	3.34

Table 9:- Mean and standard deviation of firefighters based on cognitive impairment and age

A significant result was obtained in the one-ANOVA test, in which  $F = 5.04$  (significant at .05 level) and it indicates that there are significant difference among age of firefighters and cognitive impairment. The present hypothesis tested is the cognitive impairment and age of firefighters. The F ratio obtained in the analysis was 5.04 which is significant. This means that cognitive impairment

of the three group of age i.e. firefighters having age 25-35, 36-45 and 46 and above is significantly different. The result is presented in table 8 Since analysis of variance does not show which pair of groups show significant difference, further analysis was carried out using Shaffee Test. the result are presented in table 10

Variable	Three groups	Three groups	Mean difference
Cognitive impairment	25-35	36-45	2.54*
		46above	3.05*
	36-45	25-35	-2.54*
		46 above	0.51
	46 above	25-35	-3.05*
		36-45	- 0.51

\*- significant at .05 level

Table 10:- Results of Scheffe Procedure for cognitive impairment of firefighters based on three groups of age(25-35, 36-45 and 46 and above)

The results given in table 10 indicates that cognitive impairment of 25-35, 36-45 and 46 and above aged firefighters are significantly different. In cognitive impairment the mean values obtained by 36-45 and 46 and above aged firefighters with 25-35 aged firefighters is compared and have significant difference. The mean difference being 2.54 36-45 group and 3.05 for 46 and above group. In cognitive impairment the mean values obtained by 25-35 aged and 46 and above aged firefighters with 36-45 aged is compared and 25-35 aged firefighters found to have significant difference but 46 and above found to have no significant difference. The mean difference being -2.54 for 25-35 aged firefighters and .51 for 46 and above aged firefighters. The result indicate that cognitive impairment of 25-35 and 36-45 aged firefighters is compared with 46 and above aged firefighters and 25-35 aged firefighters have significant difference but 36-45 aged firefighters have no significant difference. The mean difference being -3.50 for 25-35 aged firefighters and -.51 for 36-45 aged firefighters respectively.

The significant differences in cognitive impairment for 25-35 and 36-45 aged firefighters may be due to the aging process as it is seen that with age cognitive impairment occurs. The significant difference for 25-35 and 46 and above aged firefighters may to due to the variation in ages i.e. as discussed above aging can cause degradation to memory and cognition which is most described by biological theorists.

Consistent with the present findings Salhouse (2009) [8] identified a representation of aging which is believed to be seen in cognitive decline in speeded abilities, executive function and memory.

**D. HYPOTHESIS IV**

The fourth objective of the study hypothesized as “There will be significant difference in post traumatic stress disorder among firefighters on the basis of their age”.

ANOVA as employed to test significant difference in post traumatic stress disorder among firefighters based on age (25-35, 36-45 and 46 and above). Table 11 presents the results of the comparison

VARIABLE	SOURCE	SUM OF SQUARES	DF	MEAN SQUARE	F
POST TRAUMATIC STRESS DISORDER	BETWEEN GROUP	1706.29	2	853.15	6.3**
	WITH GROUP	7719.89	57	135.44	
	TOTAL	9426.18	59		

\*\* Significant at .01 level

Table 11:- Summary of ANOVA of post traumatic stress disorder and age among firefighters

Variable	Age	Mean	N	SD
Post traumatic stress disorder	25-35	3.89	18	4.08
	36-45	14.25	24	13.20
	46 and above	16.72	18	14.19
	Total	11.88	60	12.64

Table 12:- Mean and standard deviation of firefighters based on post traumatic stress disorder

A significant result was obtained in the one-ANOVA test, in which  $F = 6.3$  (significant at .01 level) and it indicates that there are significant difference among age of firefighters and post traumatic stress disorder. The present hypothesis tested is the post traumatic stress disorder and age of firefighters. The F ratio obtained in the analysis was 6.3 which is significant. This means that post traumatic

stress disorder of the three group age i.e. 25-35, 36-45 and 46 and above aged firefighters is significantly different. The result is presented in table 11 Since analysis of variance does not show which pair of groups show significant difference, further analysis was carried out using Shaftee Test. the result are presented in table 13

Variable	Three groups	Three groups	Mean difference
Post traumatic stress disorder	25-35	36-45	-10.36**
		46 and above	-12.83**
	36-45	25-35	10.36**
		46 and above	-2.47
	46 and above	25-35	12.83**
		36-45	2.47

\*\* - significant at .01 level

Table 13:- Results of Scheffe Procedure for post traumatic stress disorder of firefighters based on three groups of nature of work (field, office and both field and office)

The results given in table 13 indicates that post traumatic stress disorder of 25-35, 36-45 and 46 and above aged firefighters are significantly different. In post traumatic stress disorder the mean values obtained by 36-45 and 46 and above aged firefighters is compared with 25-35 aged firefighters have significant difference. The mean difference being -10.36 for 35-45 group and -12.83 for 46 and above group. In post traumatic stress disorder the mean values obtained by 25-35 and 46 and above aged firefighters with 36-45 aged and 25-35 aged firefighters have significant difference but 46 and above aged firefighters have no significant difference The mean difference being -10.36 for 25-35 group and -2.47 for 46 and above aged group. The result indicate that post traumatic stress disorder of 25-35 and 36-45 is compared with 46 and above aged and 25-35 aged firefighters is significantly different but not significant for 36-45 aged firefighters. The mean difference being 12.83 for 25-5 age group and 2.47 for 36-45 aged group respectively.

The significant differences in post traumatic stress disorder for 25-35 and 36-45 aged and 25-35 and 46 and above aged

firefighters may be due to the aging process as it is seen that with age people tend to be more stressed occurs.

Consistent to this result the National Center for PTSD (2000) [9] says that a number of reasons are present to increase PTSD with age these include role changes and functional losses may make coping with memories of earlier trauma more challenging in old age. In the general population 70-90% of adults above age 50 have high prevalence for PTSD. They also say that cognitive impairment can also lead to PTSD.

**E. HYPOTHESIS V**

The fifth objective of the study hypothesized as “There will be significant difference in cognitive impairment among firefighters on the basis of their marital status.

ANOVA was employed to test significant difference in cognitive impairment among firefighters based on their marital status. Table 14 presents the results of the comparison

VARIABLE	SOURCE	SUM OF SQUARES	DF	MEAN SQUARE	F
COGNITIVE IMPAIRMENT	BETWEEN GROUP	17.95	2	8.98	.80
	WITH GROUP	639.78	57	11.22	
	TOTAL	657.73	59		

Table 14:- Summary of ANOVA of cognitive impairment and marital status among firefighters

VARIABLE	MARITAL STATUS	MEAN	N	SD
COGNITIVE IMPAIRMENT	MARRIED	26.82	39	3.15
	UNMARRIED	27.33	12	3.42
	DIVORCED/WIDOWED	25.56	9	4.09
	TOTAL	26.73	60	3.34

Table 15:- Mean and standard deviation of firefighters based on cognitive impairment and marital status

A significant result was obtained in the one-ANOVA test, in which  $F= 0.800$  and it indicates that there are no significant difference among marital status of firefighters and cognitive impairment. The present hypothesis tested is the cognitive impairment and marital status of firefighters. The F ratio obtained in the analysis was .800 which is not significant. This means that cognitive impairment of the three group of marital status i.e. firefighters who are married, unmarried and divorced/widowed have no significant difference. The result is presented in table 14

The result of no significance in marital status of firefighters and cognitive impairment may be due to the lack of equal sample i.e. there were only 9 firefighters who are divorced/widowed and 12 of them are only unmarried and the rest 39 firefighters are married.

The present finding is opposed by Feng et.,al (2014) [10] whose findings reported that being single was associated with 2.5 times increase in cognitive impairment compared to being married. In the present study the sample size of singles firefighters are only 26% of the total sample this might the reason for not having significant difference.

**F. HYPOTHESIS VI**

The sixth objective of the study hypothesized as "There will be significant difference in post traumatic stress disorder among firefighters on the basis of their marital status".

ANOVA was employed to test significant difference in post traumatic stress disorder among firefighters based on their marital status. Table 16 presents the results of the comparison

VARIABLE	SOURCE	SUM OF SQUARES	DF	MEAN SQUARE	F
POST TRAUMATIC STRESS DISORDER	BETWEEN GROUP	702.74	2	351.37	.11
	WITH GROUP	8723.44	57	153.0	
	TOTAL	9426.18	59		

Table 16:- Summary of ANOVA of post traumatic stress disorder and marital status among firefighters

Variable	Marital status	Mean	N	SD
Post traumatic stress disorder	Married	11.17	39	11.53
	Unmarried	8.57	12	11.52
	Divorced/Widowed	17.25	9	14.48
	Total	11.88	60	12.64

Table 17:- Mean and standard deviation of firefighters based on post traumatic stress disorder and marital status

A significant result was obtained in the one-ANOVA test, in which  $F= 0.11$  and it indicates that there are no significant difference among marital status of firefighters and post traumatic stress disorder. The present hypothesis tested is the post traumatic stress disorder and marital status of firefighters. The F ratio obtained in the analysis was .11 which is not significant. This means that post traumatic stress disorder of the three group of marital status i.e. firefighters who are married, unmarried and divorced/widowed have no significant difference. The result is presented in table 16

The result of no significance in marital status of firefighters and post traumatic stress disorder may be due to

the lack of equal sample i.e. there were only 9 firefighters who are divorced/widowed and 12 of them are only unmarried and the rest 39 firefighters are married.

In a twin study on Vietnam veterans by Vietnam Era Twin Registry, V A Medical Center, (Goldberg J. et.al, 1995) [11] it was found that in the unadjusted analysis on individuals, modest correlations indicated that those who were having PTSD were more likely to have been divorced. This is a contrary study to the present investigation, but if we closely observe we can see that the percentage of sample for the divorced/widowed group is small compared to the other two groups. this might have affected the significance of the hypothesis.

G. HYPOTHESIS VII

The seventh objective of the study hypothesized as “There will be significant difference in cognitive impairment among firefighters on the basis of their years of experience.”

ANOVA was employed to test significant difference in cognitive impairment among firefighters based on their years of experience.”. Table 18 presents the results of the comparison

VARIABLE	SOURCE	SUM OF SQUARES	DF	MEAN SQUARE	F
COGNITIVE IMPAIRMENT	BETWEEN GROUP	170.30	2	85.15	9.96**
	WITH GROUP	487.43	57	8.55	
	TOTAL	657.73	59		

\*\*significant at .01 level

Table 18:- Summary of ANOVA of cognitive impairment and years of experience among firefighters.

Variable	Age	Mean	N	SD
Cognitive impairment	0-1	29.40	15	.98
	2-5	26.58	24	2.26
	6 & above	25.00	21	4.22
	Total	26.73	60	3.34

Table 19:- Mean and standard deviation of firefighters based on cognitive impairment and years of experience

A significant result was obtained in the one-ANOVA test, in which F= 9.96(significant at .01 level) and it indicates that there are significant difference among years of experience of firefighters and cognitive impairment. The present hypothesis tested is the cognitive impairment and years of experience of firefighters. The F ratio obtained in the analysis was 9.96 which is significant. This means that

cognitive impairment of the three group of years of experience i.e. firefighters having years of experience 0-1,2--5 and 6 and above is significantly different. The result is presented in table 18 Since analysis of variance does not show which pair of groups show significant difference, further analysis was carried out using Shaffee Test. the result are presented in table 20.

Variable	Three groups	Three groups	Mean difference
Cognitive impairment	0-1	2-5	2.82*
		6 and above	4.40*
	2-5	0-1	-2.82*
		6 and above	1.58
	6 & above	0-1	-4.40*
		2-5	-1.58

\*- the mean difference significant at .05 level

Table 20:- Results of Scheffe Procedure for cognitive impairment of firefighters based on three groups of years of experience (0-1, 2--5 and 6 and above)

The results given in table 20 indicates that cognitive impairment of 0-1, 2--5 and 6 and above years of experienced firefighters are significantly different. In cognitive impairment the mean values obtained by 2-5 and 6 and above years of experienced firefighters with 0-1 year experienced firefighters is compared and have significant difference. The mean difference being 2.82 for 2-5 group and 4.40 for 6 and above group. In cognitive impairment the mean values obtained by 0-1 years of experienced firefighters and 6 and above years of experienced firefighters with 2-5 years of experienced is compared and 0-1 years of experienced firefighters found to have significant difference but 6 and above found to have no significant difference. The mean difference being -2.82 for 0-1 years of experienced firefighters and 1.58 for 6 and above years of experienced firefighters. The result indicate that cognitive impairment of 0-1 and 2-5 years of experienced a firefighters is compared with 6 and above years of experienced firefighters and 0-1 years of experienced firefighters have significant difference but 2-5 years of experienced firefighters have no significant

difference. The mean difference being -4.40 for 0-1 years of experienced firefighters and -1.58 for 2-5 years of experienced firefighters respectively.

The significant differences in cognitive impairment for 0-1 and 2-5 years of experienced firefighters and the significant difference for 0-1 and 6 and above years of experienced firefighters may be because as years increases the amount of psychological and physical distress also increase in firefighters, as already discussed most firefighters quit their job due this increased psychological distress and frequent exposure of traumatic situations.

Consistent this the present study, Gow, M.K & Shakespeare, J (2003) [12], in the study Counting the cost: Psychological Distress in career and Auxiliary Firefighters they that years experience have significant effect on cognitive impairment.



**H. HYPOTHESIS VIII**

The eighth objective of the study hypothesized as “There will be significant difference in post traumatic stress disorder among firefighters on the basis of their years of experience.

ANOVA was employed to test significant difference in post traumatic stress disorder among firefighters based on their years of experience.”. Table 21 presents the results of the comparison

VARIABLE	SOURCE	SUM OF SQUARES	DF	MEAN SQUARE	F
POST TRAUMATIC STRESS DISORDER	BETWEEN GROUP	2214.18	2	1107.09	8.75**
	WITH GROUP	7212.01	57	126.53	
	TOTAL	9426.18	59		

\*\* significant at .01 level

Table 21:- Summary of ANOVA of post traumatic stress disorder and years of experience among firefighters

Variable	Age	Mean	N	SD
Post traumatic stress disorder	0-1	2.93	15	3.08
	2-5	11.42	24	9.42
	6& Above	18.81	21	15.87
	Total	11.88	60	12.64

Table 22:- Mean and standard deviation of firefighters based on post traumatic stress disorder and years of experience

A significant result was obtained in the one-ANOVA test, in which F= 8.75(significant at .01 level) and it indicates that there are significant difference among years of experience of firefighters and post traumatic stress disorder. The present hypothesis tested is the post traumatic stress disorder and years of experience of firefighters. The F ratio obtained in the analysis was 8.75 which is significant. This means that post traumatic stress disorder

of the three group of years of experience i.e. firefighters having years of experience 0-1,2--5 and 6 and above is significantly different. The result is presented in table 21 Since analysis of variance does not show which pair of groups show significant difference, further analysis was carried out using Shaffee Test. the result are presented in table 23

Variable	Three groups	Three groups	Mean difference
Post traumatic stress disorder	0-1	2-5 6 and above	-8.48 -15.88**
	2-5	0-1 6 and above	8.48 -7.39
	6 & above	0-1 2-5	15.88** 7.39

\*\* significant at .01 level

Table 23:- Results of Scheffe Procedure for post traumatic stress disorder of firefighters based on three groups of years of experience (0-1, 2--5 and 6 and above)

The results given in table 23 indicates that post traumatic stress disorder of 0-1,2--5 and 6 and above years of experienced firefighters are significantly different. In post traumatic stress disorder the mean values obtained by 2-5 and 6 and above years of experienced firefighters with 0-1 year experienced firefighters is compared and 6 and above have significant difference but 2-5 years of experience have no significant difference. The mean difference being -8.48 for 2-5 group and -15.88 for 6 and above group. In post traumatic stress disorder the mean values obtained by 0-1 years of experienced firefighters and 6 and above years of experienced firefighters with 2-5 years of experienced is compared and both are found to have significant no difference. The mean difference being 8.48 for 0-1 years of experienced firefighters and -7.39 for 6 and above years of experienced firefighters. The result indicate that post traumatic stress disorder of 0-1 and 2-5 years of experienced a firefighters is compared with 6 and above years of experienced firefighters and 0-1 years of experienced firefighters have significant difference but 2-5

years of experienced firefighters have no significant difference. The mean difference being 15.88 for 0-1 years of experienced firefighters and 7.39 for 2-5 years of experienced firefighters respectively.

The significant differences in post traumatic stress disorder for 0-1 and 6 and above years of experienced firefighters may be due to the frequent exposure to traumatic situations that increases as years of experiences increases may cause severe distress and cause higher stress to individuals. In firefighters the symptoms of PTSD become prominent after few years after the exposure to traumatic situations; this may also be a reason for the significant difference in PTSD with years of experience.

A study on Psychology of firefighter American Association of Psychological Sciences (2015) [13], found that firefighters experience a steady onslaught of trauma and intense human emotion. Perilous flames, collapsing buildings, the exploitations etc causes distress in

firefighters. This increases with years of experience. Another study Minnesota multiphasic personality inventory as related for PTSD symptoms according to job stress level in experienced firefighters by Chung, et.,al (2015) [14] found that as years of experience with traumatic events increases the likelihood of PTSD.

#### IV. LIMITATIONS OF THE STUDY

The study was conducted only in Angamaly and Kalady and hence generalizability of the study is in question. And also here the researcher admits that correlation between cognitive impairment and PTSD could be analyzed. However since the major focus was to understand the factors that contribute to cognitive impairment and PTSD and future study could be done giving focus to the relation between these variables with more sample size.

#### V. IMPLICATIONS OF THE STUDY

Even though the advancement of technology has made outstanding equipments for the safety of people from fires, accidents etc firefighting remains a hazardous occupation, where unlike in most other jobs, the primary function is one of hazard engagement complicated by extreme time pressure. The common occurrence of fire as the greatest and most frequent occupational stressor was consistent with previous physiological research in firefighting (Barr et al., 2010). [15]

Through this study it was found that aging and years of experience influence the cognitive and post traumatic stress problems in firefighters. It is seen that there are less facilities and also less importance given to firefighters with regard to their hectic work. They have to work a continuous 24 hour work schedule and also are not given adequate health checkups. They are not given counseling sections even during training or even in permanent service.

It can be seen that post traumatic stress disorder becomes evident only years after its onset and if given proper care at the beginning it can be controlled before becoming life threatening. As prevention is better than cure the firefighters should be given proper education regarding the potential risks of the job not only in the physical health but also in their psychological health.

In addition to the findings, the participants in the study reported that there is a requirement to adapt to the physical demands of firefighting environments rapidly. Other reported stressors included risk of injury to themselves or colleagues, psychological demands of the firefighting activity (such as incorrect decisions, frustration, and sleep deprivation), stressors associated with fire appliance driving, and dealing with fatally injured persons at the scene of operations. It is advisable that government should consider the dedication and hardships these people take up to help the common man in their emergency situations like accidents, fire attacks etc.

Society must understand that these people aren't mere machines and Government must take appropriate steps to ensure proper allowances and social wellbeing is guaranteed and proper support is being provided to these public servants.

#### VI. SUGGESTIONS BY INVESTIGATOR

During the course of the study I found that Psychology has a great role to play in the life of these firefighters who have to face different phases and faces of the society. They have to go through adverse and extreme situations and also have to involve with different people with different characters. Often it is not problems that become headaches for them, but the way people react to these problems. So I thought it would be better to include these suggestions along with this project:

- Various mental strategies, such as visualization, self-talk and relaxation techniques can help firefighters overcome obstacles and perform to their full potentials.
- Counseling sections can help the firefighters to boost up their morale.
- Stress management programs like meditations can be practiced.
- Develop emotional stability to cope with the pressures of emergency situations.
- Keep up an exercise program to promote positive thinking.

#### VII. CONCLUSION

The present study is on the variables cognitive impairment and post traumatic stress disorder on various socio demographic variables of firefighters. From the study it was found that age and years of experience makes cognitive impairment and post traumatic stress disorder in both office and field working firefighters.

I hope that this study will encourage clinicians to reflect on their clinical practices so they might establish therapeutic space where firefighters get immense supports. It is also my hope that future researchers will continue to explore the psychological dynamics in firefighters.

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