

# A Study on Prevalence of Post Stroke Depression and Associated Factors using Hamilton Depression Rating Scale (HAM-D)

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## ABSTRACT

**Introduction:** Post Stroke Depression (PSD) is considered the most frequent and important neuropsychiatric consequence of stroke. Early assessments can help determine possible treatment options and gauge progress. The present study was conducted to estimate the prevalence of PSD and associated factors among stroke patients and to find out the correlation between duration of stroke and depression through HAM-D.

### Aims:

-To measure PSD using HAM-D in stroke patients.

-To find out correlation between duration of stroke with level of depression experienced by stroke patients through HAM-D

**Materials and Method:** This is a cross-sectional observational study conducted across various OPDs and hospitals attached to SPB Physiotherapy College, Surat. Hamilton Depression Rating Scale (21-points) was used to assess the level of depression among a total of 50 patients. 32 males and 18 female patients of age group 40 to 75 years having acute, sub-acute or chronic stroke were included in the study. The study was conducted after obtaining a written and informed consent from the subjects.

**Results:** Out of total 50 patients, 39 were depressed i.e., 78% of the total population had PSD. The findings also indicate that there is a strong negative correlation between the time duration since the stroke had occurred and the level of depression. Acute and sub-acute phase patients had HAM-D scores higher than chronic patients.

**Conclusion:** The present study concludes that there is high prevalence of PSD in Stroke patients and 78% of the population included in the study was depressed. We concluded this by our study that PSD is a very imp aspect, and majority of stroke patient have high level of depression. That is why it is important to measure PSD so that we can develop some strategy to combat depression.

**Keywords:** Stroke, Post Stroke Depression (PSD), HAM-D

## INTRODUCTION

The World Health Organization (WHO) definition of stroke is: “rapidly developing clinical signs of focal (or global) disturbance of cerebral function, with symptoms lasting 24 hours or longer or leading to death, with no apparent cause other than of vascular origin<sup>(1, 2)</sup>. Stroke, the sudden death of some brain cells due to lack of oxygen when the blood flow to the brain is lost by blockage or rupture of an artery to the brain, is also a leading cause of dementia and depression<sup>(3)</sup>. Stroke remains one of the most devastating of all neurological diseases, often causing death or gross physical impairment or disability<sup>(4)</sup>. It often results in major changes in a person’s life. Stroke patients suffer with loss of health, occupation, social life, and independence. Common behavioural and cognitive sequelae of stroke include depression, psychosis, apathy, anxiety, personality changes and aphasia and dysprosody. Among which major depression is the common occurrence with 20% to 65%<sup>(5)</sup>. Mood disorders significantly alter the lives of the stroke patients and their families. Because crying and lack of emotions characterize the disorder, it’s better to identify them accurately and receive treatment based on the psychological assessment<sup>(6)</sup>.

Post Stroke Depression (PSD) is considered the most frequent and important neuropsychiatric consequence of stroke. Approximately one-third of stroke patients experience major depression. Moreover, this condition can have an adverse effect on cognitive function, functional recovery and survival<sup>(7)</sup>. PSD refers to persistent depression after a stroke. Expressed as loss of interest, decreased energy, decreased appetite, sleep disorders, low self-evaluation, self-blame and even repeated self-injury, suicidal thoughts or behaviours. It is the most common emotional disorder after stroke. As early as 1977, Folstein et al. reported PSD for the first time, and its incidence rate was as high as 45%<sup>(8)</sup>. The first empirical studies of PSD included

studies conducted by researchers such as Martin Roth, who demonstrated the association between atherosclerotic disease and depression, and Folstein et al., who demonstrated that depression was significantly more common in patients with stroke compared with patients with comparable physical impairments due to orthopaedic injuries. The first systematic longitudinal study of PSD found that severity of impairment in activities of daily living, social functioning, and cognitive function were all associated with PSD<sup>(9)</sup>. The Diagnostic and Statistical Manual (DSM) IV categorizes post-stroke depression as “Mood disorder due to a general medical condition (i.e., stroke)” with the specifiers of depressive features, major depressive like episodes, manic features, or mixed features<sup>(10)</sup>. Diagnosis of PSD is challenging; therefore, it often remains unrecognized and untreated. PSD is associated with cognitive impairment, increased mortality and risk of falls, increased disability, and worse rehabilitation outcome<sup>(11)</sup>. More often, patients are unable to evaluate the situation objectively which may lead to projection of blame outwardly or towards self. In the acute phase of stroke, depression has been attributed to survivor’s cognitive interpretation of physical disabilities, enforced dependency on others and uncertainty about recovery as well as prognosis. On the contrary, long term risk factors of PSD include job status, financial insecurity and permanent loss of independence among others<sup>(12)</sup>.

Detailed assessment is a crucial part of evidence-based practice. Early assessments of depressive symptoms can help determine possible treatment options, and periodic assessment throughout care can guide treatment and gauge progress. Many instruments are available to assess the level of depression in an individual. These instruments include both interview and self-report measures and may be used to screen, diagnose and/or track treatment outcomes. We have used the Hamilton Depression

Rating Scale (HAM-D) in our study. The Hamilton Depression Rating Scale for Depression, abbreviated before, during and after treatment. The scale is administered by a health care professional and contains 21 items, but is scored based on the first 17 items, which are measured either on 5-point or 3-point scales. It takes 15 to 20 minutes to complete and score<sup>(13, 14)</sup>. In this study we have used the 21-point HAM-D scale to assess depression in 50 patients.

The present study was conducted across various OPDs and hospitals attached to SPB Physiotherapy College, Surat, Gujarat to estimate the prevalence of PSD among stroke patients and associated factors. It also increases awareness among patients and reduces the complications associated with it.

## **MATERIALS & METHODS**

- 1. Study Design:** Cross-sectional Observational study.
- 2. Sampling Technique:** Convenient Sampling
- 3. Study Setting:** Various OPDs and hospitals attached to SPB physiotherapy college, Surat.
- 4. Sample Size:** 50 stroke patients out of which 18 were females while 32 were males.
- 5. Age Group:** 40 to 75 years
- 6. Study Duration:** 6 months.
- 7. Material Apparatus:** Pen, Pencil, Chair and Table.
- 8. Tools Used:** Patient Identification Form, Mini Mental Scale Examination, Hamilton Depression Rating Scale.
- 9. Outcome Measures:** We have used Hamilton Depression Scale (21 points) to assess the level of depression. The HAM-D was developed by Dr. Max Hamilton of The University of Leeds,

England in the year 1960 and since then the scale has been widely used in clinical practice to measure depression. The original 1960 version contains 17 items, but four other questions are included but not added to the total score and were only used to provide additional clinical information. Each item on the questionnaire is scored on a 3- or 5-point scale depending on the item and the total score is compared to the corresponding descriptor.

The HAM-D was chosen for this study because of its good validity and reliability, easily accessible and also the fact that it requires only 15 to 20 minutes to administer. (14)

### **10. Inclusion Criteria:**

- Male or female of age between 40-75 years.
- Patients having first episode of stroke.
- MMSE score equal to or more than 23 at the time of assessment.

### **11. Exclusion Criteria:**

- History of depression at the time of or before stroke.
- Altered sensorium.
- History of any other disabling condition before stroke.
- Acute confusional state due to general medical condition or substance use.

**12. Procedure:** In this cross-sectional study, the patients were included from various IPD and OPD attached to SPB Physiotherapy College. A close rapport was established and the purpose and procedure of the study was explained to the patient. And informed consent was obtained. The demographic data and stroke related information like name, age, gender, occupation, marital status, type of family, type of stroke, time since stroke (in months), site of lesion, and other comorbid conditions was obtained via oral interview. 50 patients were selected randomly by lottery method of selecting samples. The Hamilton

Depression Rating scale was used to assess the level of depression of the subjects. The questions from the scale were read and explained verbally to the subjects and the responses were marked manually by the researcher.

### STATISTICAL ANALYSIS

The study data was analyzed with statistical package for the social science version 20.0 (SPSS 20.0).

Descriptive analysis including frequency, percentage was carried out on the study variables.

Data was analyzed using pie charts and further frequency and percentage were

calculated using the pie charts and bar graphs.

### RESULT

The study included a sample size of 50 stroke patients.

Mean age of the stroke patients was 54.18. In the sample of 50 stroke patients, male participants were 64% and 36% were female.

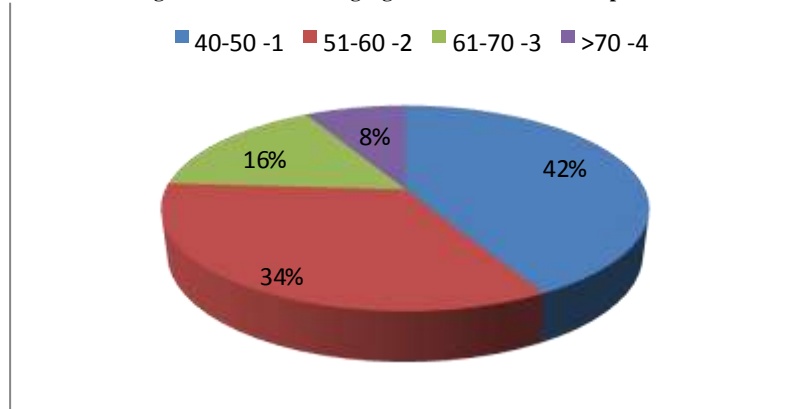
Table 1: Descriptive statistics of age and HAM-D score:

	Mean	Standard Deviation (SD)	N
HAM-D Scores	13.26	6.09	50
Age	54.18	9.66	50

Table 2: Descriptive analysis including frequency and percentage of patient's characteristics:

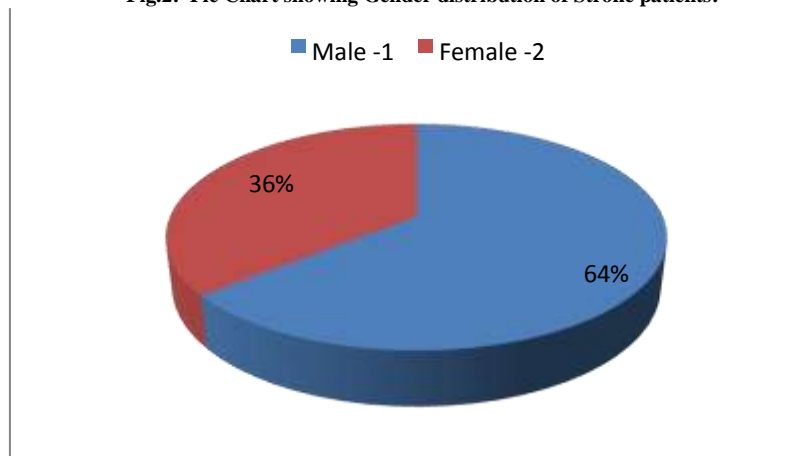
Characteristics	Frequency(n=50)	Percentage%
<b>Age</b>		
40-50	21	42.00%
51-60	17	34.00%
61-70	8	16.00%
>70	4	8.00%
<b>Gender</b>		
Male	32	64.00%
Female	18	36.00%
<b>Site of lesion</b>		
Left	23	46.00%
Right	27	54.00%
<b>Type of stroke</b>		
Ischemic	32	64.00%
Hemorrhagic	18	36.00%
<b>Time Since Stroke</b>		
Acute	18	36.00%
Sub-Acute	17	34.00%
Chronic	15	30.00%
<b>Occupation</b>		
Unemployed	33	66.00%
Inconsistent Earning	14	28.00%
Consistent Monthly	1	2.00%
Paid but not permanent	1	2.00%
Permanent Pay	1	2.00%
<b>Type Of Family</b>		
Nuclear	20	40.00%
Joint	30	60.00%
<b>Marital Status</b>		
Single	2	4.00%
Married	48	96.00%
Divorced	0	0.00%
<b>Education</b>		
Literate	34	68.00%
Illiterate	16	32.00%
<b>Other Comorbid Conditions</b>		
Hypertension	26	52.00%
Diabetes Mellitus	7	14.00%
Other Conditions	9	18.00%
No Comorbid Conditions	8	16.00%
<b>Level Of Depression</b>		
Normal	12	24.00%
Mild	15	30.00%
Moderate	13	26.00%
Severe	8	16.00%
Very Severe	2	4.00%

Fig.1: Pie Chart showing Age distribution of Stroke patients:



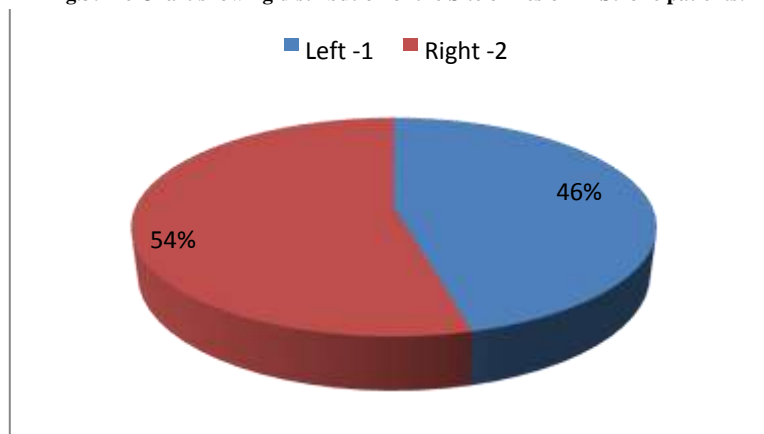
It can be seen from the chart that out of total 50 patients, 21 were of the age group 40 to 50 years, 17 were of the age group 51 to 60 years, 8 were of the age group 61 to 70 years and 4 were above 70 years of age. Thus, it contributes to 42%, 34%, 16% and 8% to our total patient population respectively.

Fig.2: Pie Chart showing Gender distribution of Stroke patients:



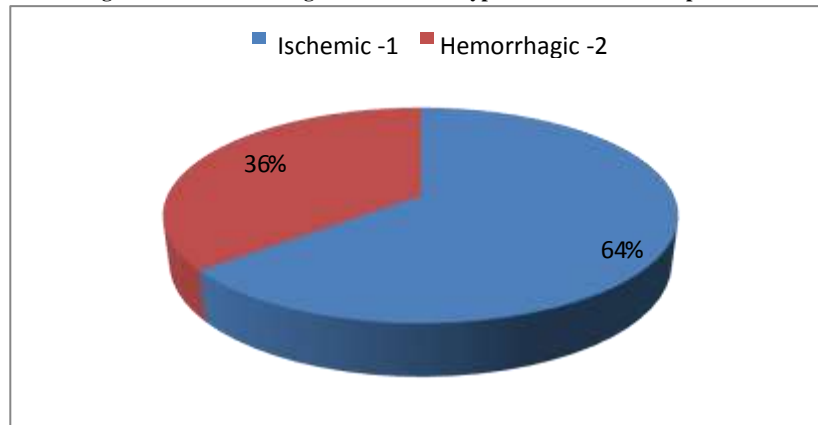
It can be seen from the chart that out of total 50 patients, 32 were male and 18 were female patients. Thus, it contributes to 64% and 36% to our total patient population respectively.

Fig.3: Pie Chart showing distribution of the Site of Lesion in Stroke patients:



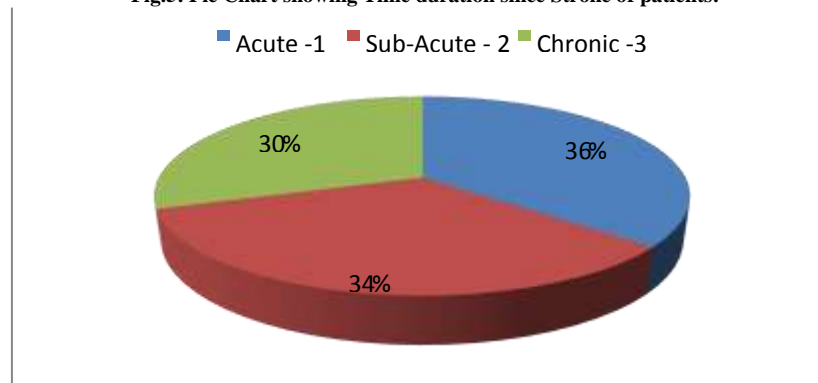
It can be seen from the chart that out of total 50 patients, 23 were having lesion on the left side of the brain and 27 were having lesion on the right side. Thus, it contributes 46% and 54% to our total population respectively.

Fig.4: Pie Chart showing distribution of Type of Stroke in Stroke patients:



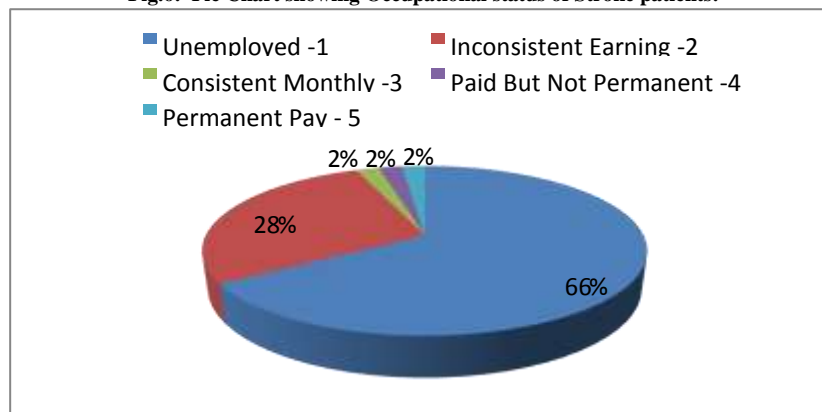
It can be seen from the chart that out of total of 50 patients, 32 had Ischemic type of stroke and 18 had Hemorrhagic type. Thus, it contributes 64% and 36% to our total patient population respectively.

Fig.5: Pie Chart showing Time duration since Stroke of patients:



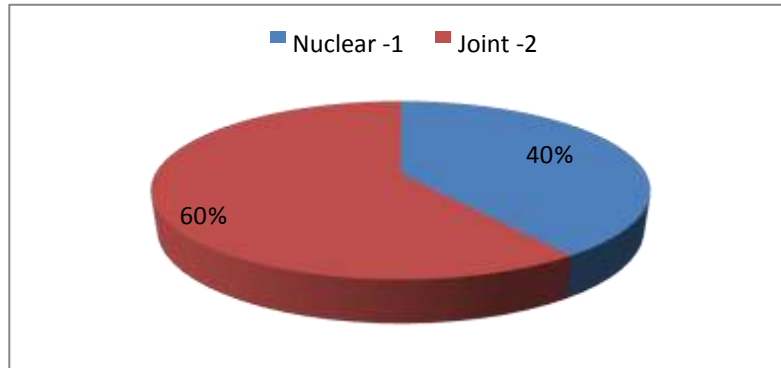
It can be seen from the chart that out of total 50 patients, 18 patients were in the Acute phase, 17 patients were in the Sub-Acute phase and 15 were in the Chronic phase. Thus, it contributes 36%, 34% and 30% to our total patient population respectively.

Fig.6: Pie Chart showing Occupational status of Stroke patients:



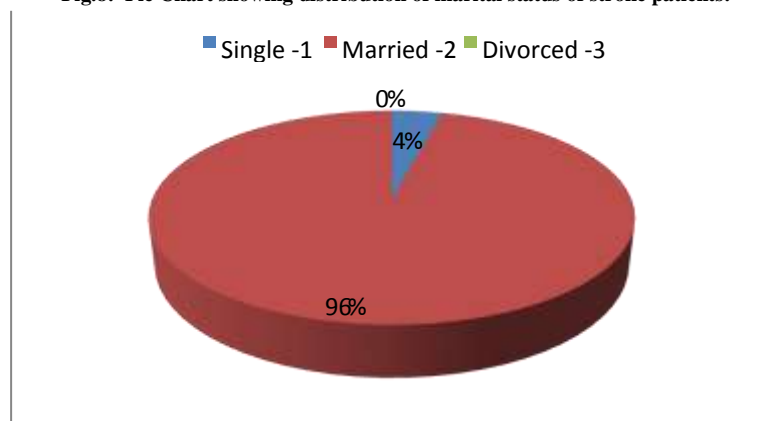
It can be seen from the chart that out of total 50 patients, 33 were unemployed, 14 were having an Inconsistent earning, 1 had consistent monthly earning, 1 was paid but not permanently and 1 had permanent pay. Thus, it contributes 66%, 28%, 2%, 2% and 2% to our total patient population respectively.

Fig.7: Pie Chart showing distribution of Type of Family of the patient:



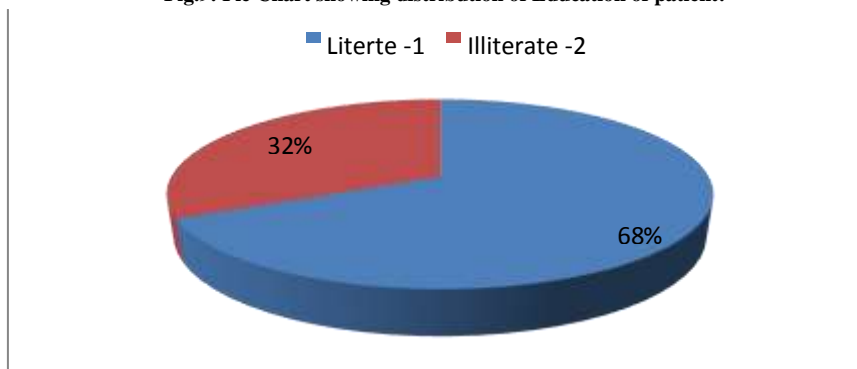
It can be seen from the chart that out of total 50 patients, 20 were having a nuclear type of family and 30 were having a joint type of family. Thus, it contributes 40% and 60% to our total patient population.

Fig.8: Pie Chart showing distribution of marital status of stroke patients:



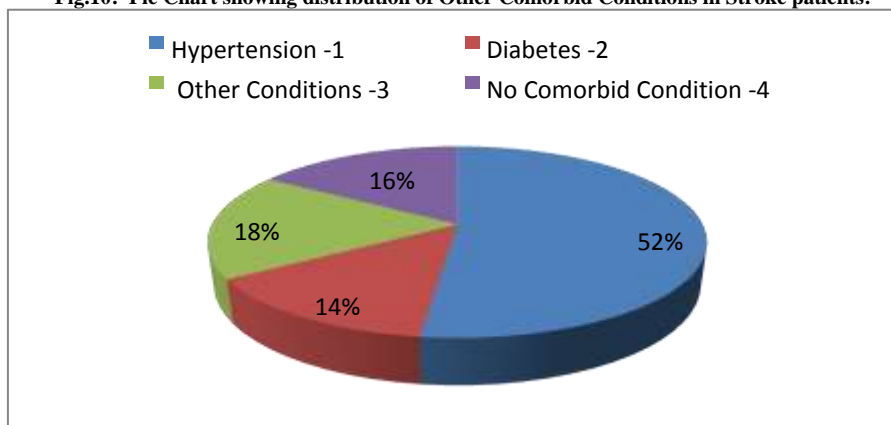
It can be seen from the chart that out of total 50 patients, 2 were single, 48 were married and none were divorced. Thus, it contributes 4%, 96% and 0% to our total patient population respectively.

Fig.9: Pie Chart showing distribution of Education of patient:



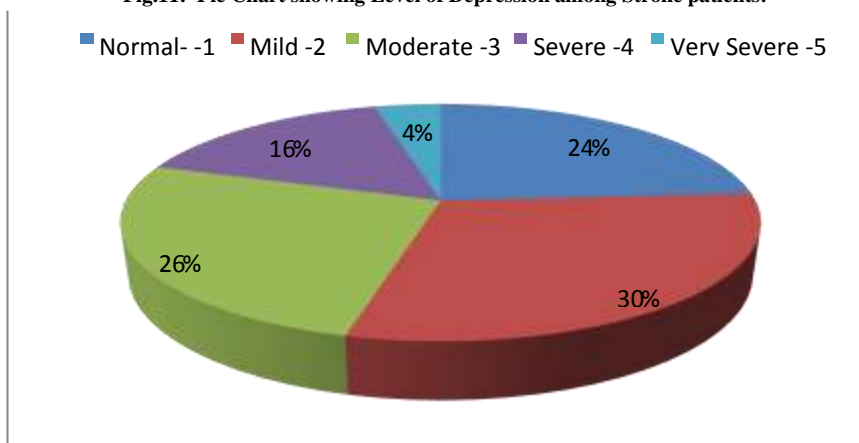
It can be seen from the chart that out of 50 patients, 34 were literate and 16 were illiterate. Thus, it contributes 68% and 32% to our patient population respectively.

Fig.10: Pie Chart showing distribution of Other Comorbid Conditions in Stroke patients:



It can be seen from the chart that out of total 50 patients, 26 had Hypertension, 7 had Diabetes Mellitus, 9 had other comorbidities and 8 had no other comorbid conditions. Thus, it contributes 52%, 14%, 18% and 16% to our total patient population respectively.

Fig.11: Pie Chart showing Level of Depression among Stroke patients:



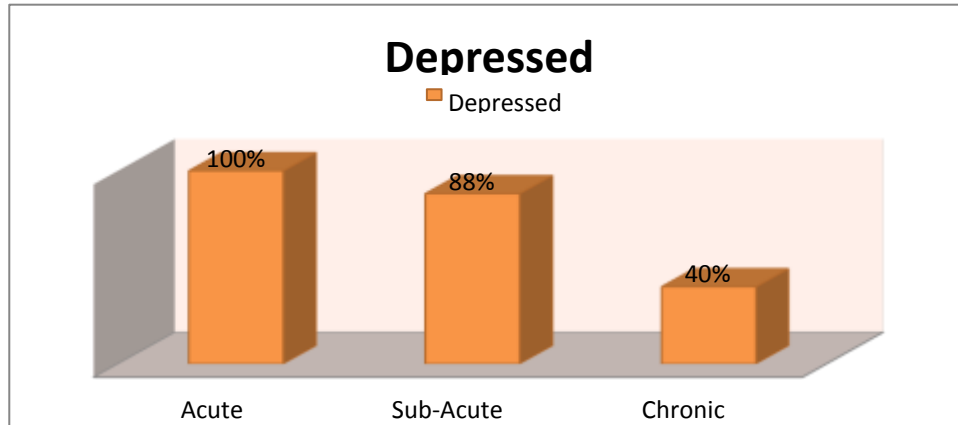
It can be seen from the chart that out of total 50 patients, 12 were normal, 15 had Mild Level of Depression, 13 had Moderate Level of Depression, 8 had Severe Level of depression and 2 had Very Severe Level of Depression. Thus, it contributes 24%, 30%, 26%, 16% and 4% to our total patient population respectively.

Table 3: Descriptive analysis showing frequency and percentage of depression:

Characteristics	Depressed	% Depressed
<b>Time Since Stroke</b>		
Acute(n=18)	18	100.00%
Sub-Acute(n=17)	15	88.20%
Chronic(n=15)	6	40.00%
<b>Gender</b>		
Male(n=32)	24	75.00%
Female(n=18)	15	83.30%
<b>Type of Stroke</b>		
Ischemic(n=32)	26	81.30%
Hemorrhagic(n=18)	13	72.20%
<b>Site of Lesion</b>		
Left(n=23)	18	78.30%
Right(n=27)	21	77.80%
<b>Type of Family</b>		
Joint(n=30)	22	73.30%
Nuclear(n=20)	16	80.00%

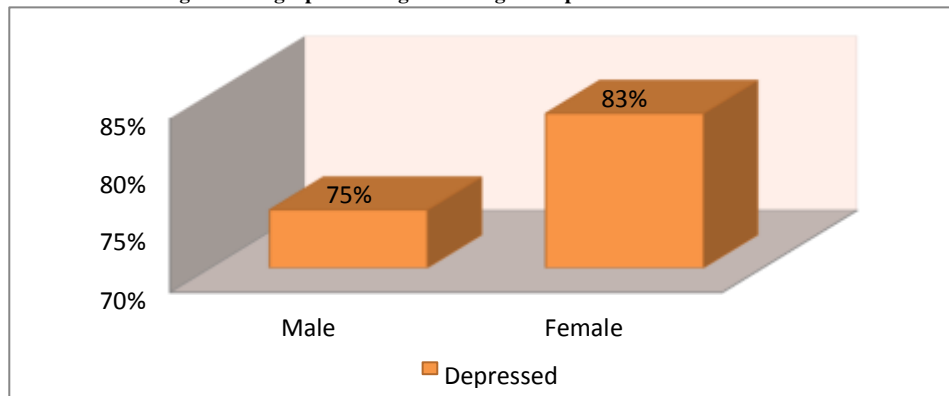


Fig.12: Bar graph showing Percentage of depressed population in different phases of Time Since Stroke:



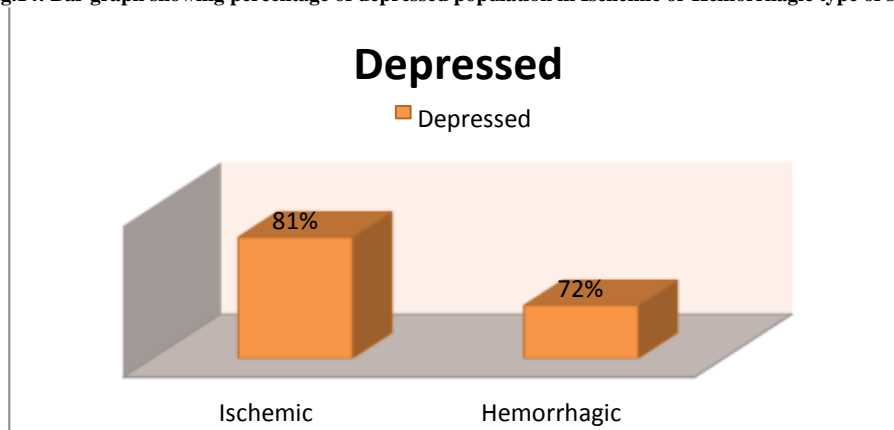
It can be seen from the above fig. 12 that out of total 50 patient population, 18 patients were of the acute phase, out of which all 18 were depressed, 17 patients were of the sub-acute phase, out of which 15 were depressed and 15 patients were of the chronic phase, out of which 6 were depressed. Hence, 100%, 88.2% and 40% population of the acute, sub-acute and chronic phases were depressed respectively.

Fig.13: Bar graph showing Percentage of depressed Males and Females:



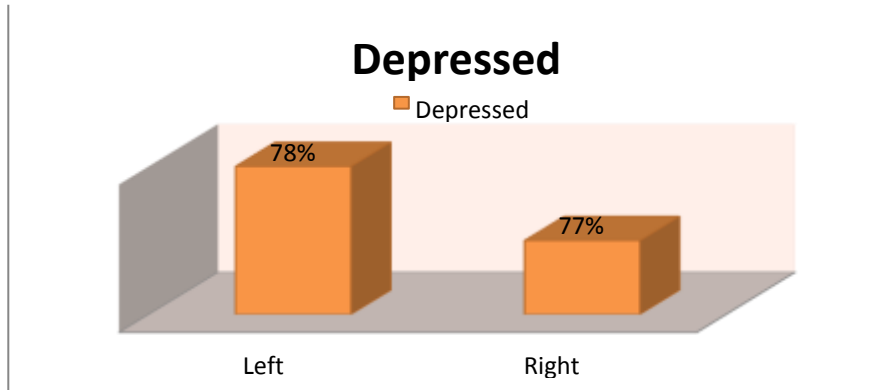
It can be seen from the above fig.13 that out of total 50 patient population, 32 were males, out of which 24 were depressed and out of total 18 females, 15 were depressed. Hence, 75% and 83.3% of the males and females were depressed respectively.

Fig.14: Bar graph showing percentage of depressed population in Ischemic or Hemorrhagic type of stroke:



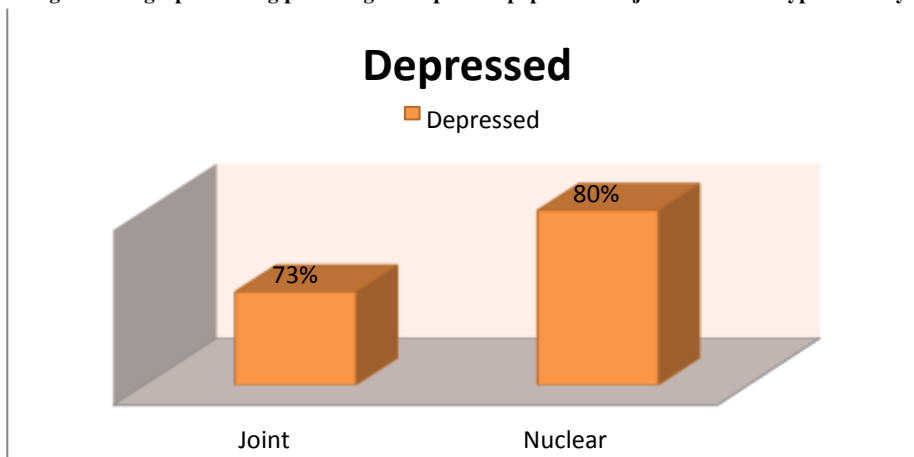
It can be seen from the fig.14 that out of a total of 50 patient population, 32 patients had ischemic type of stroke, out of which 26 were depressed and 18 patients had hemorrhagic type of stroke, out of which 13 were depressed. Hence, 81.30% and 72.20% of the ischemic and hemorrhagic type of stroke patients were depressed respectively.

Fig.15: Bar graph showing percentage of depressed population having left or right site of lesion:



It can be seen from the fig.15 that out of total 50 patient population, 23 patients had lesion on the left side of the brain, out of these 18 were depressed and 27 patients had lesion on the right side, out of which 21 were depressed. Hence, 78.20% and 77.80% of the patients having left and right sided site of lesion were depressed respectively.

Fig.16: Bar graph showing percentage of depressed population in joint or nuclear type of family:



It can be seen from the fig.16 that out of total 50 patient population, 30 patients had a joint type of family, out of which 22 were depressed and 20 patients had nuclear family, out of which 16 were depressed. Hence, 73.3% and 80% of the patients having joint and nuclear family were depressed respectively.

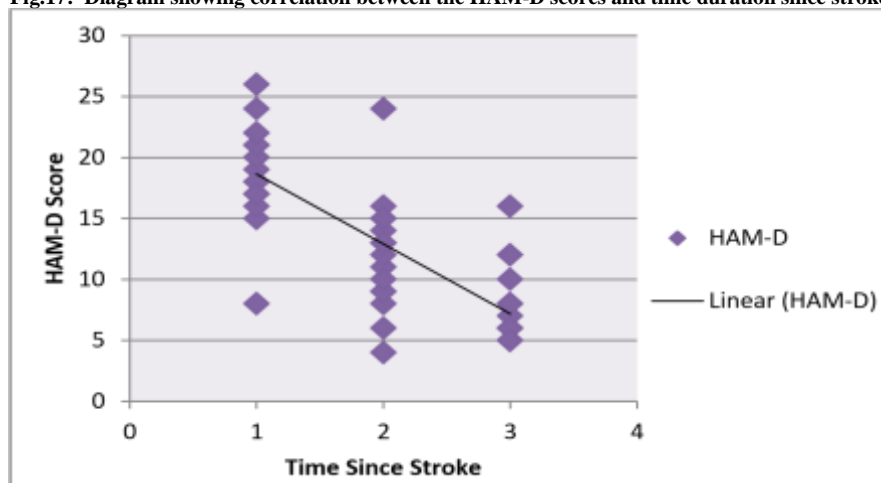
### Correlation between Time Duration of stroke and HAM-D score

Table 3: Correlation between The HAM-D scores and the time duration since stroke:

		HAM-D Time Since Stroke Score	
Spearman's rho	HAMD Score	Correlation Coefficient	1.000
		Sig. (2-tailed)	.000
N			50
			50
Time since Stroke	Correlation Coefficient	-.785**	1.000
	Sig. (2-tailed)	.000	
N			50
			50

\*\* Correlation is significant at the 0.01 level (2-tailed)

Fig.17: Diagram showing correlation between the HAM-D scores and time duration since stroke:



It can be clearly seen from the scatter diagram that there is a negative correlation between the time duration since stroke and the respective HAM-D scores. This implies that the level of depression decreased as the time duration since stroke increased and hence, the patients in acute phase were the most depressed, the patients in sub-acute phase had lesser depression level and the patients of chronic phase had the least level of depression.

## DISCUSSION

The main purpose of this study was to determine the prevalence of Post Stroke Depression among stroke patients and also to find correlation between time duration since stroke and level of depression. The data obtained from this study indicate that 39 out of the total 50 patients were depressed. Thus, 78% of the post stroke patients included in the study were depressed. The patients from various clinics and hospital across Surat, Gujarat were included.

Post Stroke Depression (PSD) is a major neuropsychiatric consequence of stroke and a detailed knowledge about its prevalence would help in early diagnosis and in providing better treatment options to the patients. HAM-D scale was used in our study to assess the level of depression.

Our findings from this study indicate that there is a strong negative correlation between the time duration since the stroke

has occurred and the level of depression. 100% of the acute patient population was depressed, 88% of the sub-acute patient population was depressed and only 40% of the chronic patient population was depressed. Our findings are also in tandem with a similar study by Mshelia Anthony Ali et al. (2018) on “Depression and disability among stroke patients in Maiduguri, Nigeria” in which it was stated that “This study found significantly higher prevalence of depression among those with duration of stroke <6 months, and a progressive decrease of the prevalence of depression as the duration of the stroke increases.”<sup>(15)</sup>

Other findings indicate that the females were more depressed than the males. This was also supported by the findings of other authors in their previous studies.<sup>(16, 17, 18)</sup>

Rasika Khare et al. (2012) conducted: “A Cross Sectional Study to assess the prevalence of depression among stroke patients” in which she made a comparison between level of depression in males and females, according to the analysis females were more depressed than males. This may be related to women’s poor psychological quality, sensitivity, psychological and physiological imbalance. Another possible explanation is that women live longer than men, so women have an average age greater than men when they encounter a stroke.<sup>(19)</sup>

The present study also indicates that the patients having ischemic type of stroke had

more depression levels. 81% of the ischemic type stroke patients were depressed whereas 72% of the haemorrhagic type had depression. This finding was consistent with that of the previous studies by <sup>(20)</sup> Jim Litton et al. (2016) who conducted: “A cross sectional study of prevalence and determinants of depression among stroke patients.” In which he stated that in terms of stroke related factors; ischemic stroke was associated with more depression. <sup>(21)</sup>

This study found higher prevalence of depression among patients with left hemispheric lesion as compared to the patients having right hemispheric lesion. 78% of the patients with left sided lesion were depressed and 77% of the patients with right sided lesion. These findings were supported by the findings of Litton J. et al. (2016) in his study that PSD was primarily associated with left sided hemispheric lesion. <sup>(21)</sup> Recent MRI studies have provided data that suggest the involvement of the left sided lesions in post-stroke depression. <sup>(22)</sup>

This study also found that there is a higher prevalence of PSD in patients having nuclear type of family. 80% patients having a nuclear type of family were depressed whereas 73% of patients having a joint type of family were depressed. This finding concurred with the previous study of author M Buvneshkumar et al. (2018): “A Study on prevalence of depression and associated risk factors among elderly in a rural block of Tamil Nadu.” And he indicated in his study findings there were relatively higher levels of depression in nuclear family. <sup>(18)</sup>

There is a need for early diagnosis of PSD because in most cases, PSD can go undiagnosed and the above-mentioned vulnerable groups may suffer due to that and the recovery might get delayed. Early diagnosis and adequate therapy are still necessary in stroke rehabilitation to attenuate stroke complications.

There is also a need for further studies on PSD. Future studies can be conducted involving large sample size and with longer duration of follow up to improve the

possibility of early diagnosis and better treatment options and to understand the relationship between neurological damage and depression following stroke.

We concluded this by our study that PSD is a very imp aspect, and majority of stroke patient have high level of depression. That is why it is important to measure PSD so that we can develop some strategy to combat depression.

## CONCLUSION

The overall study concluded that there is high prevalence of PSD among stroke patients. About 78% of the stroke patients included in the present study were depressed which indicates that more than 3/4<sup>th</sup> of the population reflected depressive symptoms. This shows that PSD is significant neuropsychiatric sequelae of stroke and its prevalence is high and frequent. The results of this study indicate that there is a strong negative correlation between the time since stroke and the level of depression. There are high chances of PSD occurrence in acute and sub-acute patients as compared to chronic phase patients. We suggest that acute and sub-acute stroke patients be routinely screened for depression given its high prevalence. PSD may hamper the recovery rate in stroke patients and also delays the impact of rehabilitation program.

### *Declaration by Authors*

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**Conflict of Interest:** The authors declare no conflict of interest.

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