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Original Research Article

A Study of Relationship of Apathy and Depression with Functional Outcome in First Episode Schizophrenia Patients

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Abstract:

Introduction: Schizophrenia is most prevalent incapacitating psychiatric disorders due to its severe and persistent psychotic symptoms, varied cognitive dysfunction, and severe psychosocial impairment. Apathy-related symptoms, such "indifference" or "lack of interest," were acknowledged as essential components of the condition in Kraepelin's and Bleuler's diagnoses of schizophrenia. Depression has long been recognised as a symptom of schizophrenia, dating back to when Bleuler originally coined the word. [11] Depression is very common among patients with schizophrenia at all stages, especially in the acute phase. [11]

Aim: To study the contribution of apathy and depression to functional outcome in first episode schizophrenia.

Materials and Methods: A prospective study was conducted over a period of 1 year among 98 participants diagnosed with Schizophrenai recruited from the Out-Patient Department and at the time of discharge from the In-Patient wards of Government Hospital for Mental Care, Visakhapatnam. The Global Assessment of Functioning (GAF) Scale was used to determine the global level of functioning in the patients. Apathy was assessed by using Apathy Evaluation Scale Clinician version (AES – C) in patients. The Hamilton Depression Rating Scale (HAMD) was used to assess the level of depression in patients.

Results: Mean scores of Apathy were found to be 28.53 (SD±3.690) at base line, 27.18(SD±2.753) in first follow up and 26.73(SD±1.934) at second follow-up. Mean scores of Depression were found to be 6.02 (SD±1.275) at base line, 5.75(SD±0.750) in first follow up and 5.88(SD±0.768) at second follow up. Mean scores of Functioning were found to be 78.91 (SD±4.506) at base line, 80(SD±3.640) in first follow up and 80.43(SD±3.266) at second follow up. On applying multiple regression analysis on scores pf AES, HAMD and GAF scales at baseline, first follow up and second follow up it's found that at baseline correlation co efficient between AES and GAF is found to be – 0.728 which is statistically significant at p value of 0.001 (<0.005) but at baseline correlation coefficient between HAMD and GAF scores is found to be – 0.421 which is statistically insignificant with a p value of 0.152 (>0.05).

Conclusion: Apathy which is a negative symptom in schizophrenia can occur even in early stages of illness and would predict short term and long term outcome of the patients. Depression which can also present in any stage of illness but can be treated with pharmacotherapy and due to fluctuating course would contribute less to the functional outcome than apathy.

Keywords: Apathy, Depression, First Episode Schizophrenia.

Introduction

Schizophrenia is most prevalent incapacitating psychiatric disorders due to its severe and persistent psychotic symptoms, varied cognitive dysfunction, and severe psychosocial impairment. [22]

It is possible to say that schizophrenia is more of a syndrome than a single illness because it consists of a number of illnesses with various clinical presentations etiology and treatment outcomes. Disruptions in perception emotion cognition reasoning and behaviour are examples of Signs and symptoms that can vary. [23]

According to the National Mental Health Survey 2016, schizophrenia affects 0.4 percent of the Indian population, compared to an estimated 1% global prevalence. [24] Because schizophrenia is a

chronic disorder characterised by a course consisting of psychotic relapses alternated with periods of full or partial remission, the annual incidence around the world can be as high as 0.7 cases per 1000, resulting in a huge economic burden estimated at around $65 billion annually in direct and indirect costs, adding up to an estimated 3% of all healthcare expenditure. [25]

A crippling condition called schizophrenia is marked by negative symptoms such dulled affect, alogia, anhedonia, and asociality as well as neurocognitive deficiencies. Hallucinations and delusions are positive symptoms. Negative feelings and neurocognitive deficiencies seem to be more resistant to therapies, while positive symptoms can frequently be successfully treated with antipsychotic medication. [8] Negative symptoms can be separated into two categories. Symptoms of muted affect and alogia make up the first dimension, reduced expression. The second dimension categorises motivational and pleasurable impairments, which show themselves as signs of anhedonia, avolition, and asociality. This characteristic is what we call apathy. [5]

Lack of motivation that is not caused by a low level of consciousness, cognitive decline, or emotional suffering is known as apathy. [4]

Apathy-related symptoms, such "indifference" or "lack of interest," were acknowledged as essential components of the condition in Kraepelin's and Bleuler's diagnoses of schizophrenia. [5]

The primary element of negative symptoms that has been constantly emphasised is apathy. Apathy was found in studies to be more significantly related with functional outcome than any other symptom in both chronic schizophrenia and first episode psychosis, according to a specific measure of apathy. [5] Despite these historical testimonies, there hasn't been much quantitative research on the extent of apathy in schizophrenia and how it relates to other clinical traits. Depression has long been recognised as a symptom of schizophrenia, dating back to when Bleuler originally coined the word. [11] Depression is very common among patients with schizophrenia at all stages, especially in the acute phase. [11]

All stages of schizophrenia patients, but especially those in the acute phase, frequently experience depression. According to reports, the prevalence of depressive symptoms among patients with schizophrenia varies from 25% to 81%, depending on the treatment environment, stage of the illness, and definition of depression. [26]

Review of Literature

In a study conducted by Siv Hege Lyngstad et al. in 2018 in Norway titled 1. A prospective study was conducted to determine the prevalence of persisting depression, persisting apathy, how much they overlap, and their respective connections to functioning over the course of a one-year follow-up with 125 patients who had first episode psychosis. Apathy was measured by the Apathy Evaluation Scale, Clinician version, depression by the Calgary Depression Scale for Schizophrenia, and functional outcome was measured using the Global Assessment of Functioning Scale-split version, functioning sub-scale. It was discovered that FEP sufferers of PD, PA, and overlapping PD/PA have significantly decreased functionality.

In a study conducted by London C Butterfield et al.in 2010 in university of south florida [2].To ascertain the impact of apathy and depression on cognitive functioning, a cross-sectional study including 68 PD patients was conducted. The self-rating version of the apathy evaluation scale and a few questions from the beck depression inventory II were used to gauge apathy and depressive symptoms. Using the Wisconsin Card Sorting Test and the Hopkins Verbal Learning Test—Revised, cognitive abilities were evaluated. Apathy symptoms were significantly and negatively correlated with executive functioning, but not depression. Immediate memory had a strong and unfavourable relationship with both apathy and depression. Along with everyday functioning issues, caregiver stress and burden, noncompliance with prescribed medications, and higher mortality, apathy is also linked to cognitive impairment.

Michael Kiang and colleagues in 2003 at the University of Toronto in Canada conducted a study [4]. A cross-sectional investigation on the clinical correlates and connection between apathy in schizophrenia and functional outcome. The Apathy Evaluation Scale was used to evaluate 28 patients with schizophrenia who were taking antipsychotic medications. Using a survey of independent living skills, functional outcome was evaluated. According to the AES, schizophrenia patients' mean levels of apathy were substantially higher than those of comparably healthy control participants. Apathy in the patients did not substantially link with either the positive or the negative symptoms. It was not affected with the overall negative subscale score, but it was substantially correlated with the item "emotional withdrawal" on the negative subscale of the Positive and Negative Syndrome Scale (PANSS). The relationship between apathy and functional result was stronger than the relationship between other symptom measures and it existed irrespective of other negative symptoms.

In a study conducted by George Konstantakopoulos et al. in 2011 in Greece [5] a cross-sectional study to understand the connections between schizophrenia patients' apathy, cognitive deficiencies, and psychosocial functioning. The

clinician version of the Apathy Evaluation Scale and a wide range of neuropsychological tests were administered to 36 chronic schizophrenia patients and 36 matched healthy volunteers. The Personal and Social Performance scale was used to measure functioning, and the Positive and Negative Syndrome Scale and the Calgary Depression Scale for Schizophrenia were used to measure additional symptoms. Poorer performance on executive tests was strongly and specifically linked to apathy in the sick group. Results show that on a cross-sectional basis in schizophrenia, apathy has a higher connection to functional impairment than cognitive deficiencies. Additionally, they propose that apathy and executive dysfunction may be two distinct expressions of the same condition.

In a study conducted by Ann Faerden et al. in 2009 [6] in Norway. Study participants included 103 first-episode psychosis patients and 62 members of a healthy control group in order to examine which patient characteristics are linked to higher levels of apathy, how apathetic first-episode psychosis patients are compared to a healthy control group, and how apathy and other symptoms affect functioning. The shortened, clinician-rated version of the Apathy Evaluation Scale was used to measure apathy. The Positive and Negative Syndrome Scale was used to evaluate additional clinical symptoms. The subsequent studies made use of the PANSS five-factor model. The split version of the Global Assessment of Functioning scale was used to evaluate functioning. In this study, it was discovered that compared to the healthy group, more than 50% of patients with first-episode psychosis had clinical apathy. The presence and effects of apathy should therefore be assessed at the beginning of treatment. Of all clinical variables, only premorbid childhood social functioning, change in social functioning, and disorganised symptoms had a significant association with AES-C-scores. Apathy is a common symptom in first-episode psychosis and has a significant association with daily functioning.

In a study done by Amy R Koreen et al. in 1993 [9] 39 men and 31 women with their first episode of schizophrenia were assessed using behavioural and extrapyramidal symptom scales before therapy (baseline), biweekly during acute treatment, and afterwards monthly. A "syndromal" definition of depression based on Research Diagnostic Criteria and extracted Hamilton Rating Scale for Depression scores were obtained. For up to 5 years, prospective patient follow-up was conducted. The results of the study imply that depressive symptoms may be a fundamental component of acute disease in individuals with their first episode of schizophrenia or they may be a subjective response to the experience of psychotic decompensation. Since the majority of depressed symptoms disappeared when the psychosis subsided, antidepressant therapy should only be given to patients whose depression still remains. In a study conducted by Jing Dai et.al., in china in 2017 [10]. 240 first-episode individuals with schizophrenia who were drug-naive were recruited for a cross sectional research. To assess depressed symptoms and psychopathology, all patients were evaluated using the Positive and Negative Syndrome Scale and the 17-item Hamilton Depression Rating Scale. Results indicate a strong connection between depressed symptoms and overall psychopathology, as well as cognitive impairment, in a Chinese Han population with FEND schizophrenia.

In a study done by Robin Vloeberghs et al. in Duch in 2018 [16]. 50 patients with dementia, 97 patients with mild cognitive impairment, and 117 cognitively healthy controls (GC) underwent the Repeatable Battery for the Assessment of Neuropsychological Status (RBANS) (DEM). In addition, the Geriatric Depression Scale (GDS) and the Apathy Evaluation Scale clinical version (AES-C) were given. Patients with MCI, DEM, and GC have a varying prevalence of apathy and depressive symptoms, and within the MCI group, apathy and depression are linked to various cognitive domains.

In a study done by Rujvi Kamat et al. in brazil in 2013 [17] A cross sectional study Participants in the cognitive, psychiatric, and neurological evaluations were 29 HIV-negative and 43 HIV-positive people. The second version of the Beck Depression Inventory (BDI-II) is used to assess depression, neurocognitive complaints using the Patient's Assessment of Own Functioning Inventory, and reductions in instrumental daily living activities using the Activities of Daily Living questionnaire. Diagnostics for MDD were produced by the MINI-Plus. The neurological evaluation and items from the BDI-II were used to measure apathy, which was described as social disengagement, difficulty making decisions, loss of interest, and enjoyment. The HIV+ cohort experienced severe functional problems as well as apathy and despair. Despite being linked to despair, indifference was only ever linked to practical problems. It may be possible to identify HIV-infected patients who are at risk for functional issues and who could benefit from additional care to retain independence by paying clinical attention to apathy and depression. In a study done by Carlos Henrique Ferreria Camargo et al. in 2017 in state university of Ponta Grossa Brazil.” [21] The study enrolled 49 patients who had previously visited the neurology service. The International Parkinson and Movement Disorder Society's PDD diagnostic criteria were used to determine the presence of Parkinson disease dementia. The Scales for Outcomes in Parkinson's Disease-Cognition were used to measure cognition. Using the Montgomery-

Asberg Depression Rating Scale, depression was assessed. Using the Apathy Evaluation Scale, apathy was assessed. According to research, apathy is more common and pervasive than depression in PDD, has a larger association with more severe dementia, and can exist either alone or in conjunction with depression. In contrast, depression only occurs in PDD at less advanced stages. The findings emphasise the significance of distinguishing between apathy and depression in order to properly plan therapy for PD patients, particularly those in the advanced stages of disease.

In a study done by Joe J Simon et.al., has done a study in Germany in 201038 While undergoing functional magnetic resonance imaging, 15 people with schizophrenia or schizoaffective disorder receiving atypical antipsychotic medication and 15 healthy people participated in a probabilistic monetary incentive delay task. The findings imply that apathy, or a lack of desire and drive, may specifically be related to the relationship between unpleasant symptoms and reward anticipation. Although it is not directly linked to self-rated anhedonia, impaired hedonic reward processing may help people with schizophrenia develop depressed symptoms. These findings highlight the need for a clearer distinction between detrimental and affective symptoms of schizophrenia.

In a study conducted by Robert R Conley in 2007 [26] Large-scale prospective naturalistic observational study that involved multiple centres was conducted. The study included a total of 2228 participants. The MADRS total score at enrollment was used to group participants into "Depressed" or "Non-depressed" cohorts. [32] Functional variables that were measured with 4 instruments for the depressed and non-depressed cohorts were compared. The SCAP-Health Questionnaire, the Global Assessment of Functioning Scale, the Quality of Life Scale, and the medical records of the patients, which contained data on the use of mental health resources during the course of the previous six-month period (SCAP-HQ). The findings suggested that compared to those who are not depressed, people with schizophrenia with concurrent depressive symptoms have worse long-term functional outcomes. The need for specialised therapeutic interventions is highlighted by their lower quality of life, more reliance on mental health services, and higher likelihood of engagement with law enforcement. Recovery depends critically on the non-psychotic aspects of schizophrenia being treated.

A study done by Lorena Garcia – Fernandez et al in 2022 in spain [7]The Clinical Assessment Interview for Negative Symptoms (CAINS), The Functioning Assesment Short Test, and The Quality of Life Scale were used to evaluate 61 outpatients. conclusions about the relationships between adverse symptoms domains and both functioning and quality of life represents a distinct and greater predictive power for the motivation and pleasure subscale compared to the expression subscale, giving the experiential deficits domain a higher impact on severity and greater weight in outcome, enhancing prior research showing that those patients with a predominant motivation and pleasure subscale score also had, in addition, significantly more severe conceptual disorganisation, greater social cognition impairment, higher rates of ocular and mental health problems, and higher rates of ocular and mental health problems.

A study done by Norman Verdolini et al. in 2021 in spain [35] The current study's objective was to assess how home environment types and mental family history affected the functioning of individuals with first-episode psychosis (FEP). FEP patients and healthy controls (HC) were evaluated at baseline and two years afterwards. The Family Environment Scale (FES) and the Functional Assessment Short Test (FAST) were used to assess the family environment and functional outcome respectively. No particular family environment style was linked to functioning in HC and FEP patients. On the other hand, FEP patients performed better when their father had a favourable family history of mental illness. After two years, lower rates of an active, recreational, and achievement-oriented home environment and higher rates of moral-religious emphasis and control were linked to poorer functioning in non-affective psychiatric patients. In affective psychiatric patients, higher rates of family conflict were linked to poorer functioning. Psychosocial functioning is influenced by both the home environment and mental history, which has significant repercussions for early therapies that should involve both patients and caregivers.

A critical review and metanalysis done by Diana O Perkins et al in 2005 [37] Through July 2004, English-language articles on the length of untreated psychosis were published in peer-reviewed journals were examined. The duration of untreated psychosis may be a prognostic factor that is possibly controllable, according to the results. It may be possible to better understand the pathophysiology of schizophrenia and develop more effective treatment approaches by gaining a grasp of the mechanism through which the length of untreated psychosis affects prognosis.

Aims and Objectives

Aim

To study the contribution of apathy and depression to functional outcome in first episode schizophrenia.

Objectives

1. To measure the degree of depression at baseline and follow up

2. To measure the degree of apathy at base line and follow up

3. To measure the level of functioning at baseline and follow up

Hypothesis

Apathy has more profound impact on functioning than depression in first episode schizophrenia patients.

Methodology

Source of Data: The Participants of the study were recruited from the Out-Patient Department and at the time of discharge from the In-Patient wards of Government Hospital for Mental Care, Visakhapatnam.

Study Design: Prospective Study

Study Period: duration of 1 year

Inclusion Criteria:

1. Subjects between 18 and 60 years of age.
2. Subjects diagnosed with Schizophrenia according to ICD 10 DR criteria and are diagnosed for the first time with the diagnosis
3. Subjects who have given valid, written, informed consent.

Exclusion Criteria:

1. Subjects who refuse to give consent.
2. Subjects with Epilepsy, Neurocognitive Disorders, Neurodegenerative Disorders, Intellectual Disability, or Developmental Disorders.
3. Subjects with Mental and Behavioral Disorders due to Psychoactive Substance Use (not including Nicotine).
4. Subjects with past history of psychiatric illness.

Methodology: The study was conducted after obtaining Institutional Ethics Committee approval from the Ethics Committee, Andhra Medical College, Visakhapatnam. Patients who were fulfilling the diagnostic criteria for Schizophrenia according to ICD-10 DCR were 20 included in this study. Demographic data including age, gender, marital status, education, occupation, socioeconomic status, and place of residence were recorded. Illness variables like age at onset of illness, duration of illness, presence/absence of a family history of similar illness and premorbid personality were obtained using a semi-structured questionnaire.

The Global Assessment of Functioning (GAF) Scale was used to determine the global level of functioning in the patients. Apathy was assessed by using Apathy Evaluation Scale Clinician version (AES – C) in patients.

The Hamilton Depression Rating Scale (HAMD) was used to assess the level of depression in patients.

Sample size: A total of 98 patients were included in the study through convenient sampling technique.

Study tools:

1. Consent Form
2. Semi-structured questionnaire for socio-demographic data and illness variables
3. Hamilton Depression Rating Scale (HMRD)
4. Apathy Evaluation scale clinician version (AES – C).
5. Global Assessment of Functioning (GAF).

Consent Form:

A self-designed informed consent form, which explained the nature of the study, was prepared. The contents of the consent form were explained in the vernacular language and were read out to the subjects. The signatures or left thumbprints (in case of illiterates) of the subjects consenting to the study were taken.

General Information Sheet:

A self-designed form was used to collect the personal and socio-demographic details of the subjects. The form contained questions concerning the data for identification like name, age, gender, marital status, educational status, occupational status, socioeconomic status, and place of residence. Details of illness variables like age at onset of illness, duration of illness, number of hospital admissions in the past, presence/ absence of a family history of similar illness, were also obtained.

Hamilton Depression Rating Scale

Max Hamilton created the HDRS in 1960 to evaluate the severity of depression in patients. [27,28] It contains 17 variables, measured In the original article, twenty one items were published as part of the HAM-D, but according to Hamilton, scores on the last four items (diurnal variation, depersonalization /derealization, paranoid symptoms, and obsessional/compulsion symptoms) were uncommon in depression and hence not included for scoring. Clinical items include depressed mood, feelings of guilt, insomnia, suicide, loss of interest, retardation, agitation, psychic anxiety, gastrointestinal symptoms, general somatic symptoms, genital symptoms, insight, hypochondriasis and loss of weight. HDRS is scored as mild (score range 10-13), mild to

moderate (score range 14-17) and moderate to severe (score 18 or above), with maximum score being 52either on five point or three-point scales. It is the most widely used scale for rating the severity of depression [29. 30].

Global Assessment of Functioning (GAF)

A clinician-rated scale, the GAF is graded on a scale from 0 to 100. The Scale is evenly divided into intervals of 10 points, with 91–100 representing excellent functioning and no symptoms and 1–10 representing a constant risk of seriously injuring oneself or others. On a fictitious continuum of mental health illness, it is used to evaluate the patients' overall functioning while taking into account their psychological, social, and occupational functioning. [32] A rating of the patient's current and highest level of functioning has been found to be helpful in predicting treatment outcomes and the reduction in symptom severity both during and after therapy. [31]

Apathy Evaluation Scale Clinician version (AES – C)

Robert S. Marin and colleagues created AES in 1990. Apathy in adult patients was measured and described using the Apathy Evaluation Scale (AES). The AES was created for a variety of rater sources, including self-rated, informant, and clinician versions. The clinician version is based on interviewees' self-reports and clinical observations. Depending on the version utilised and the subject's capabilities, it takes 10 to 20 minutes to administer. includes 18 things. Each item is essentially a measure of overt goal-directed action, goal-related cognitions, or goal-related emotional responses. There are three different categories of questions. Semi-structured interviews are used to administer the AES-C. Items are scored according to the subject's "thoughts, feelings, and actions" over the previous four weeks, which provide evidence of current functioning.

Statistical Analysis:

Statistical Package for Social Sciences [SPSS] for Windows Version 25.0 was used to perform statistical analyses.

Descriptive Statistics:

Descriptive analysis of all the explanatory and outcome parameters was done using frequency and proportions for categorical variables, whereas the Mean & Standard Deviation (SD) were used for continuous variables.

Inferential statistics:

Chi square test was used to assess the association between the categorical variables and functioning at second follow up. Repeated measure ANOVA was used to compare mean scores of apathy, depression and functioning at baseline, 3 months follow up and 6 moths follow up.

Multiple linear regression analysis was done to know the correlation between functioning and apathy, depression at baseline, first follow up and second follow up.

Results

A total of 98 participants with diagnosis of schizophrenia according to ICD 10 DR criteria and are of first episode.3 participants lost follow up after baseline assessment and 95 participants were assessed at 3 months (first follow up). A total of 5 participants lost second follow up which is at 6 months after baseline assessment.

Demographic characteristics of the sample:

Age:

Table: 1 Descriptive statistics of Age

Statistical measure	Value(years)
Mean	28.50
Median	28.00
Mode	30
Std.Deviation	6.059
Minimum	18
Maximum	48

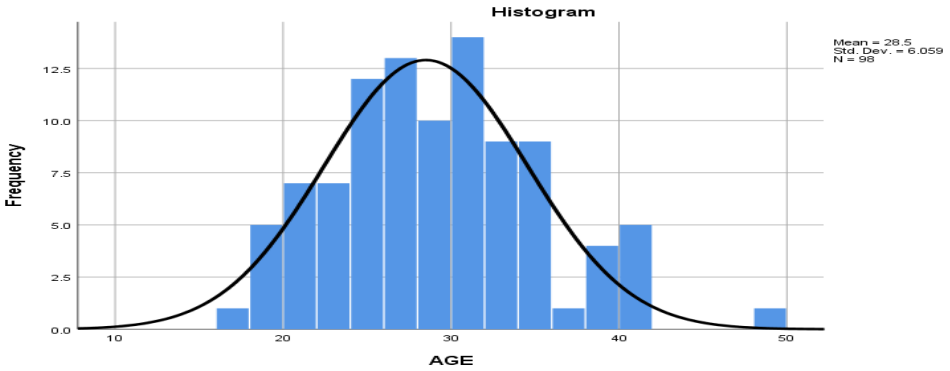

Figure 1: Distribution of study participants

The mean age of study participants was 28.5 years with a standard deviation of 6.059 years. The median is 28years, Mode is 30 years. The minimum age was 18 years and the maximum age was 48 years. Sample followed normal distribution as shown in the figure: 1 Distribution of the study participants according to the age is shown in the below table and graph.

It was seen that 9.2%(n=9) participants were below age of 20 years , 59.2%(n=58)were between 21-30 years , 29.6%(n=29) were between 31-40 years , 2% (n=2) were between 41-50 years.

Table 2: Distribution of study participants according to age category

Age category in Years	Frequency	Percent
<20	9	9.2
21-30	58	59.2
31-40	29	29.6
41-50	2	2.0
Total	98	100.0

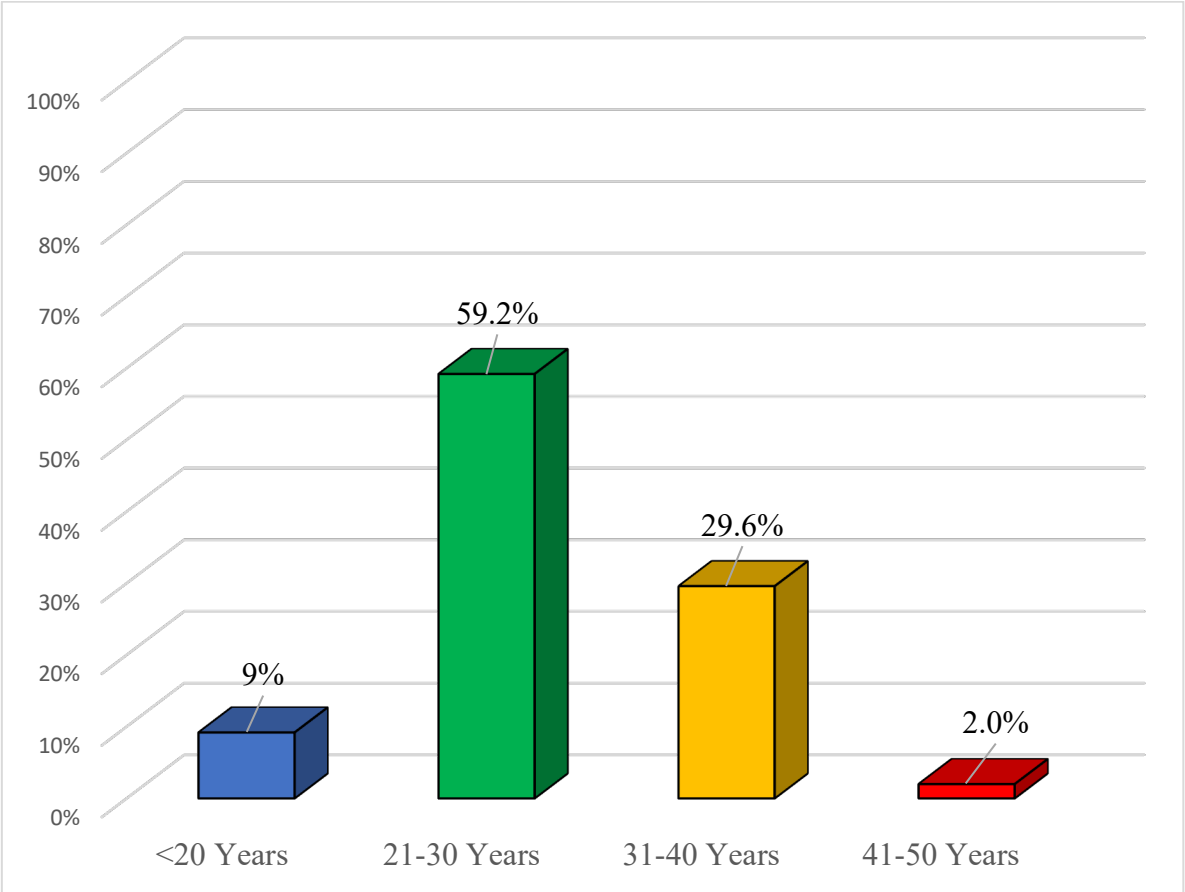

Figure 2: Distribution of study participants according to age category

Gender: Distribution of the study participants according to the gender is shown in the below table and graph.

Out of total 98 participants 52% (n=51) were males, 48% (n=47) were females.

Table 3: Gender wise distribution of study population

Gender	Frequency	Percent
Males	51	52.0
Females	47	48.0
Total	98	100.0

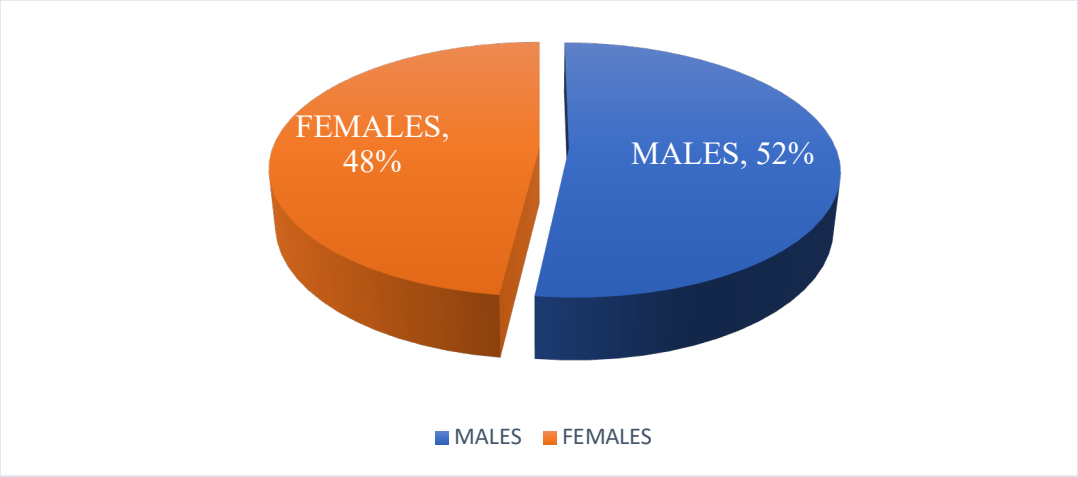

Figure 3:

Domicile: Distribution of the study participants according to the domicile is shown in the below table and graph.
Out of total 98 participants 54.1% (n=53) were from rural area and 45.9% (n=45)were from urban area.

Table: 4 Distribution of study population according to Domicile

Domicile	Frequency	Percent
Rural	53	54.1
Urban	45	45.9
Total	98	100.0

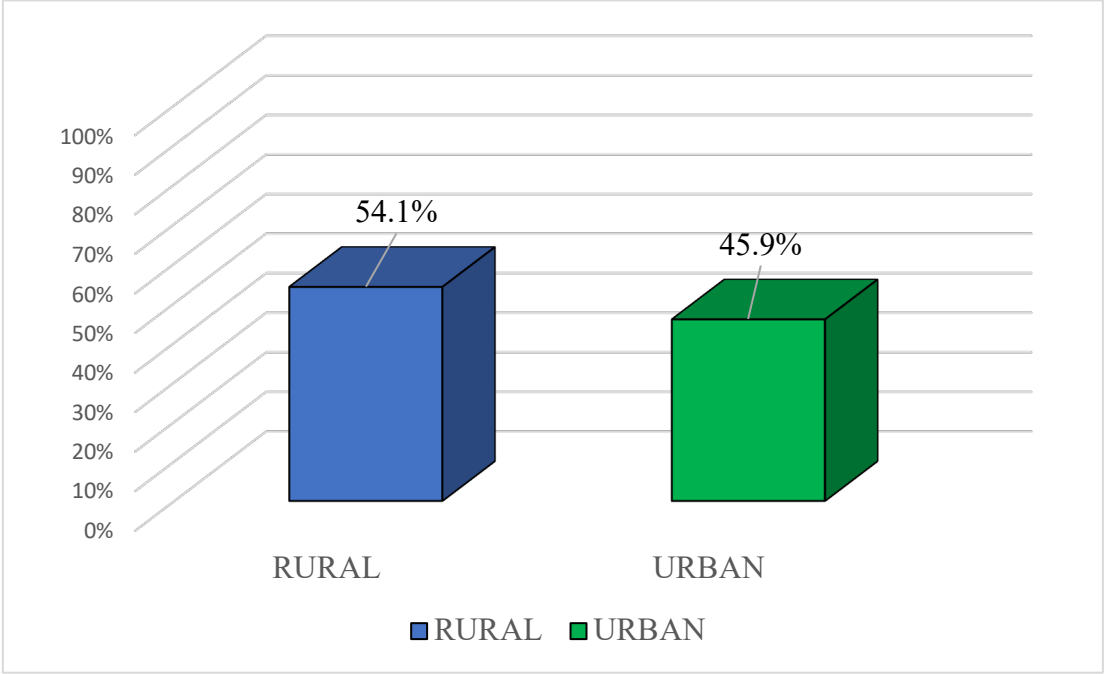

Figure 4: Distribution of study population according to Domicile

Religion: Distribution of the study population according to the religion is shown in the below table and figure. Majority of the study participants are Hindus which is 85.7% (n=84). A minority belongs to Muslims 5.1% (n=5) and Christians 9.2% (n=9).

Table: 5 Distribution of study population according to Religion

Religion	Frequency	Percent
Hindus	84	85.7
Muslims	5	5.1
Christians	9	9.2
Total	98	100.0

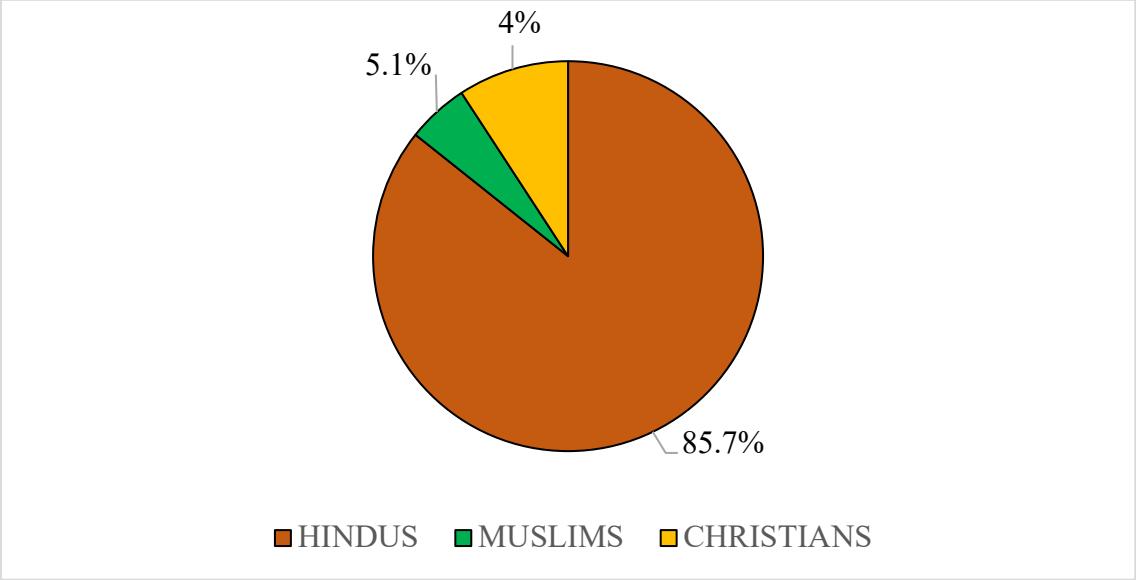

Figure 5: Distribution of study population according to Religion

Marital Status: Distribution of the study population according to their marital status is shown in the below table and figure.

Out of 98 participants 49% (n = 48) are married, 42.9% (n= 42) are unmarried, 6.1%(n=6) are divorced and 2%(n= 2) are widowed.

Table: 6 Distribution of study population according to Marital status

Marital Status	Frequency	Percent
Married	48	49.0
Unmarried	42	42.9
Divorced	6	6.1
Widow	2	2.0
Total	98	100.0

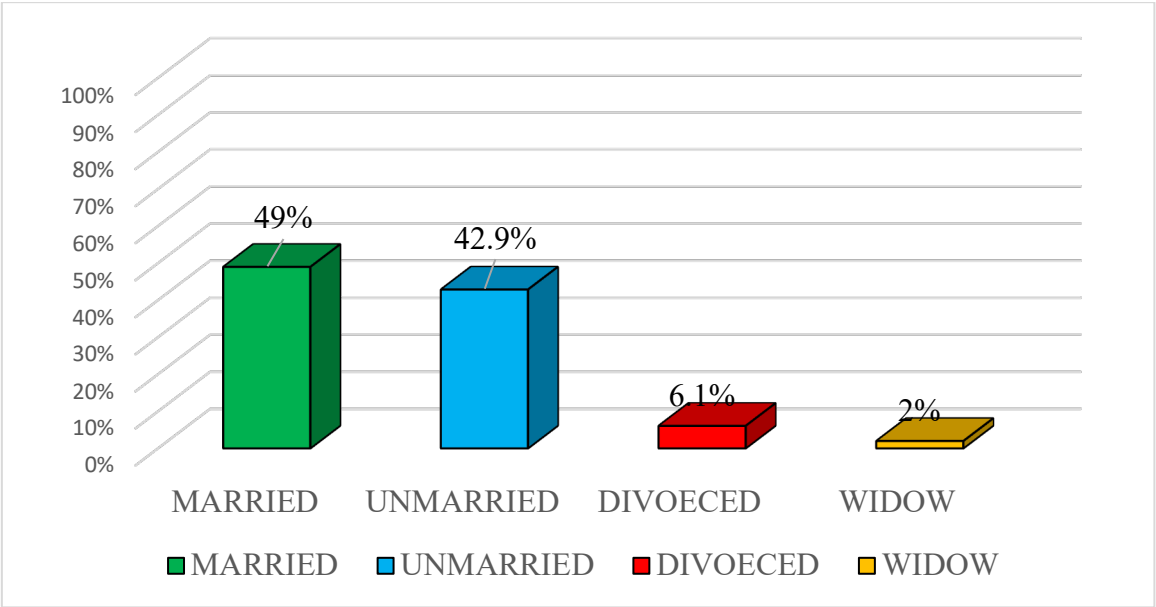

Figure: 6 Distribution of study population according to Marital status

Education: Distribution of the study population according to their educational status is shown in the below table and figure. Out of 98 participants 21.4%(n=21) are illiterates, 22.4%(n=22) completed till primary education, 21.4%(n=21) completed high school education, 15.3%(n=15) studied up to higher secondary education, 19.4%(n=19) are graduates.

Table 7: Distribution of study population according to Educational status

Education	Frequency	Percent
Illiterate	21	21.4
Primary	22	22.4
High School	21	21.4
Higher Secondary	15	15.3
Graduate	19	19.4
Total	98	100.0

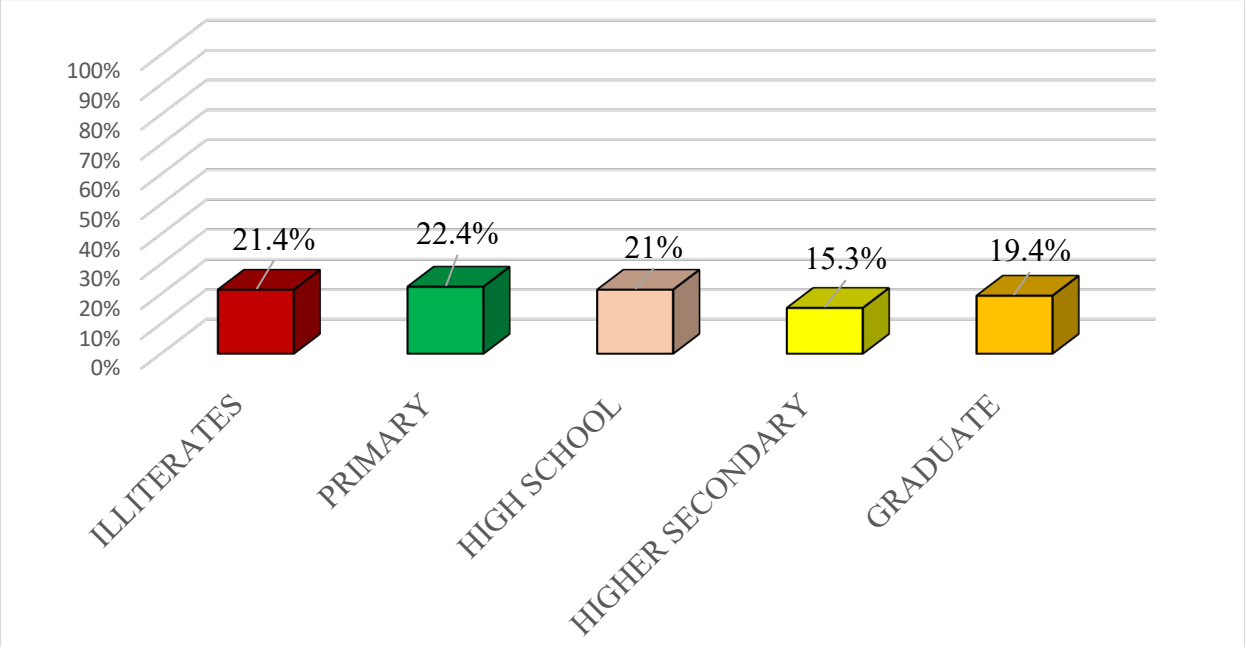

Figure: 7 Distribution of study population according to Educational status

Occupation: Distribution of the study population according to their occupational status is shown in the below table and figure out of 98 participants 46.9% (n=46) were unemployed and 53.1% (52) are employed.

Table: 8 Distribution of study population according to Occupational status

Occupation	Frequency	Percent
Unemployed	46	46.9
Employed	52	53.1
Total	98	100.0

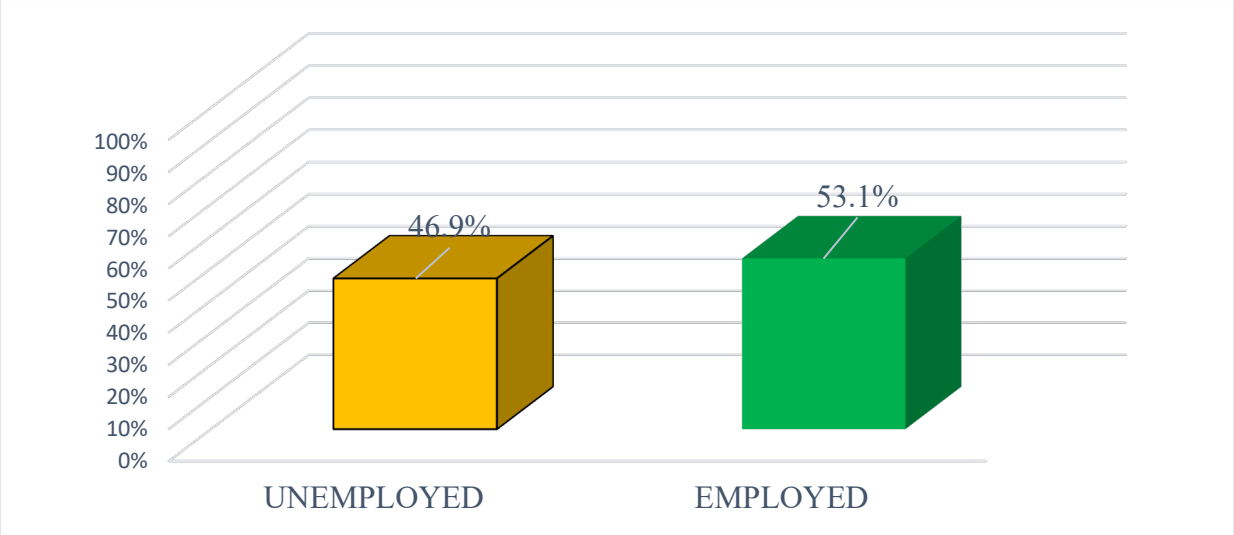

Figure 8: Distribution of study population according to Occupational status

Socio Economic Status: Distribution of study population according to their social economic status is shown in the following figure under table. out of 98 participants 92.9%(n= 91) belonging to lower economic status, 1%(n=1) belong to upper lower, 5.1%(n=5) participants belong to lower middle, and 1%(n=1) participant belong to upper middle socio economic status.

Table 9: Distribution of study population according to Socio-Economic status

Socio-Economic Status	Frequency	Percent
Lower	91	92.9
Upper Lower	1	1.0
Lower Middle	5	5.1
Upper Middle	1	1.0
Total	98	100.0

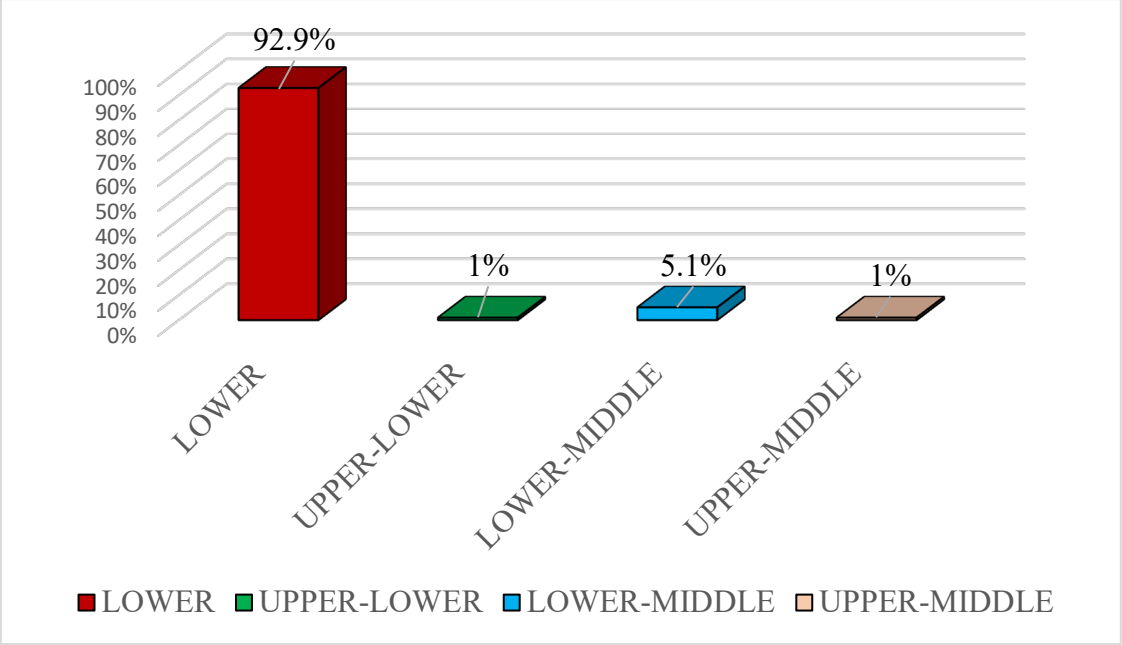

Figure 9: Distribution of study population according to Socio-Economic status

Type of Family: Distribution of study population according to their social economic status is shown in the following figure under table. Out of 98 participants 100% of the study population belongs to nuclear family.

Table 10: Distribution of study population according to type of family

Family Type	Frequency	Percent
Nuclear	98	100%

Joint	0	0%
Total	98	100%

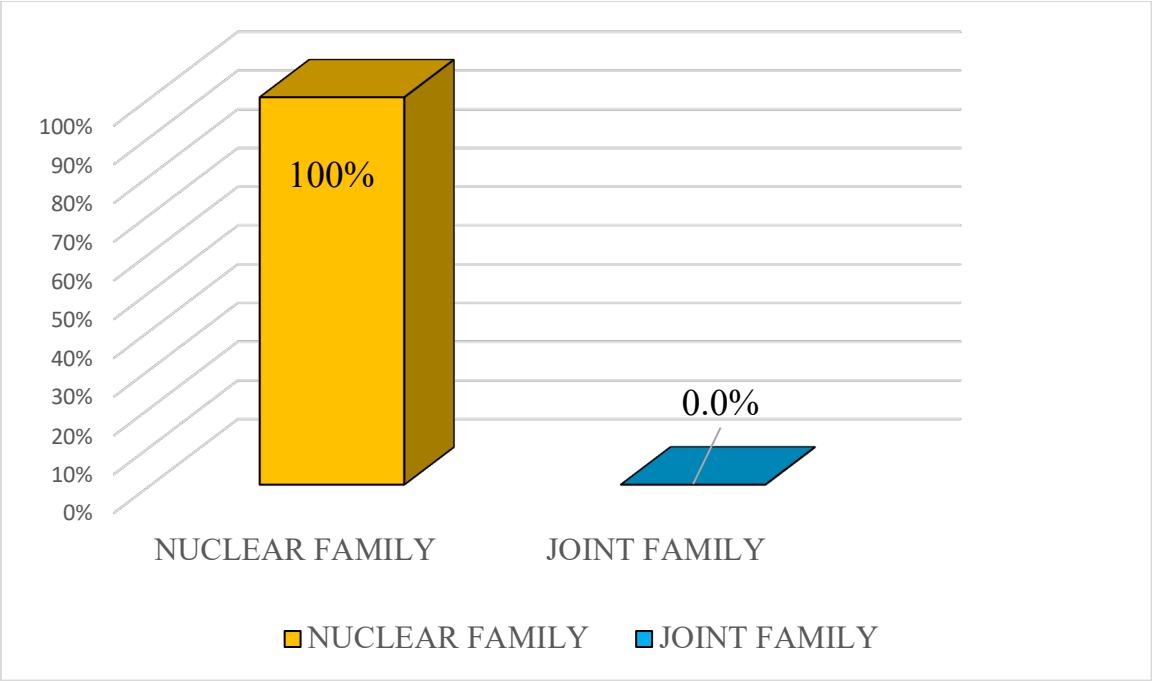

Figure 10: Distribution of study population according to type of family

Family history of psychiatry: Distribution of study population based on family history of psychiatric illness is shown in the below table and figure. Out of 98 participants 39.8% (n=39) has family history of psychiatric illness and 60.2% (n=59) has no history of psychiatric illness in the family.

Table 11: Distribution of study population according to family history of Psychiatric illness

Family history of Psychiatric illness	Frequency	Percent
YES	39	39.8
NO	59	60.2
Total	98	100.0

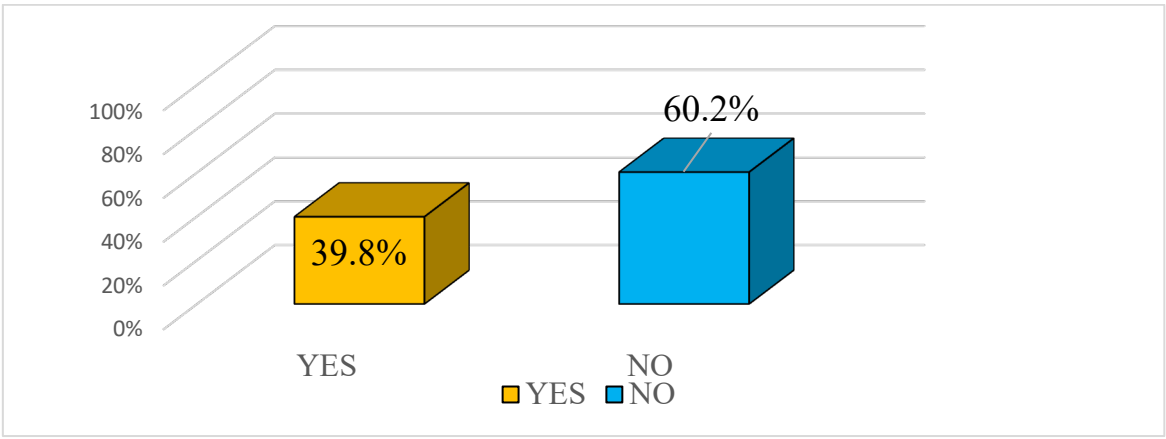

Table 11: Distribution of study population according to family history of Psychiatric illness

Duration of Illness: Distribution of study population based on duration of illness is shown in the below table and figure. Out of 98 study participants in 58.2% (n=57) of participants have duration of illness less than one year and 41.8% (n=41) participants have more than one year of illness.

Table 12: Distribution of study population according to Duration of illness

Duration Of Illness	Frequency	Percent
LESS THAN 1 YR	57	58.2
MORE THAN 1 YR	41	41.8

Total	98	100.0

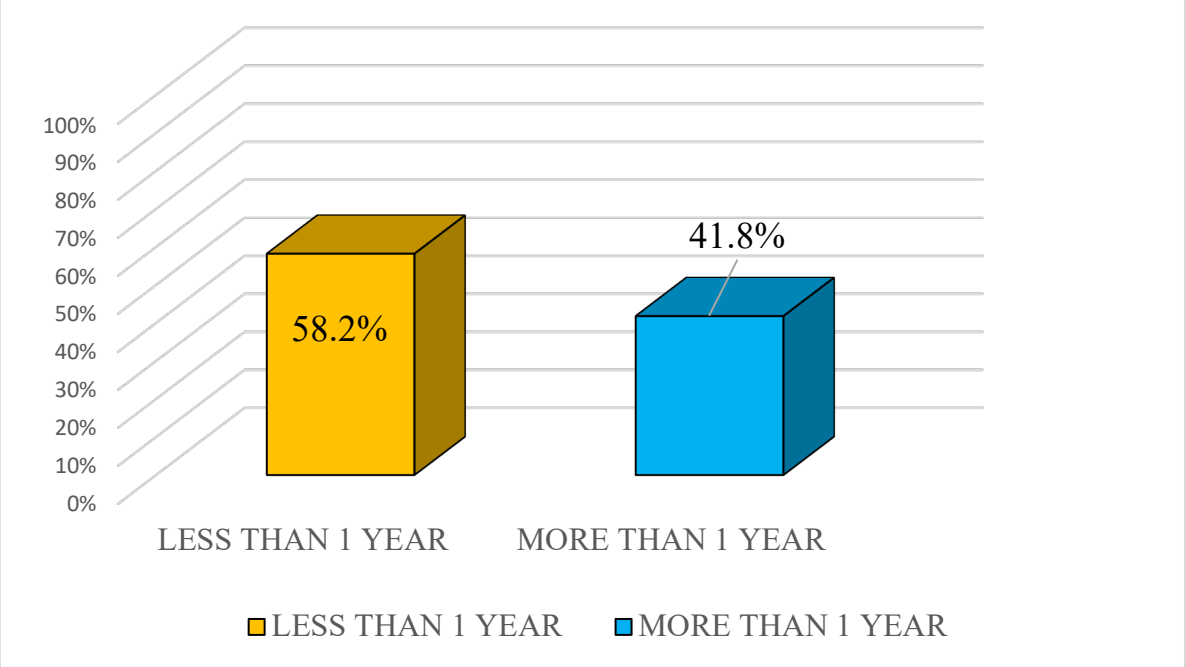

Figure 12: Distribution of study population according to Duration of illness

AES Scores: The below table shows the mean AES scores of all the subjects at baseline, first follow up and second follow up.

Table 13: Table showing Mean AES scores at base line, first and second follow ups

	Mean	Std. deviation	N
Base line	28.53	3.690	92
Follow up 1	27.18	2.753	92
Follow up 2	26.73	1.934	92

Mean scores of Apathy were found to be 28.53 (SD±3.690) at base line, 27.18(SD±2.753) in first follow up and 26.73(SD±1.934) at second follow up.

Table 14: Table showing results of repeated measure ANOVA performed on mean AES scores

ANOVA Table	Sum of squares	df	Mean squares	F	Sig.
Between groups	161.942	2	80.971	23.024	0.0001
Within groups	208450.091	273			
Subjects	149.761	91			
Error	640.058	182	3.517		
Total	209401.852				

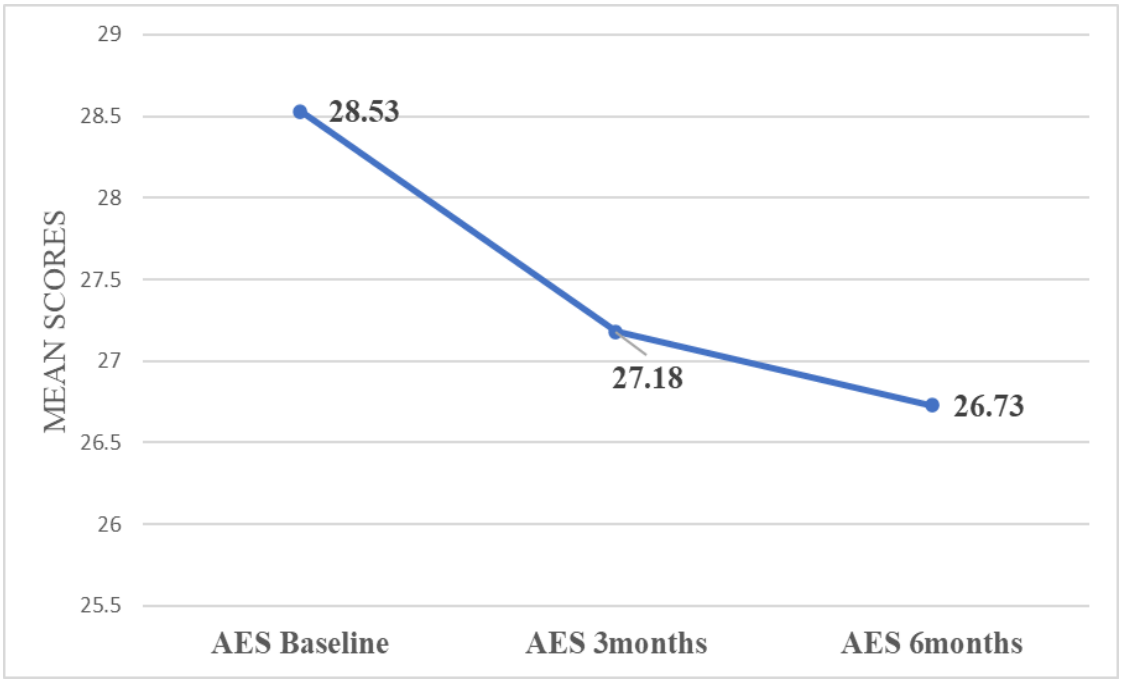

Figure 13: Shows the mean scores of Apathy evaluation Scale (AES SCORES) at various phases (baseline, 3months,6month follow-up)

Above table shows the results of repeated measure ANOVA performed on AES scores. Results showed that the F (2,182) value found to be 23.024 with a p value of 0.0001(<0.05) which imply that there is a significant difference between the means of AES at 3 levels of observation. As the difference between the mean AES scores at 3 levels of observation is significant, post hoc analysis with pair wise comparison was done. Post hoc pair wise comparison showed a decrease in mean AES score between initial assessment and follow up assessment 3months later is statistically significant with a p value of 0.0001 (<0.05). when scores at 3 months and 6 months were compared decreasing trend followed which is statistically significant with a p value of 0.001 (<0.05) and when scores at initial assessment and score at 6 months follow up were compared the decrease in scores were more and are statistically significant with p value of 0,0001 (<0.05). Therefor the results for the ANOVA indicate a significant time effect for apathy in first episode schizophrenia patients.

Table 15: Table showing results of post hoc analysis done on mean AES scores

Test	Mean difference	Std. error	Sig.
Baseline and first follow up	1.348	0.314	0.0001
First follow up and second follow up	0.457	0.138	0.001
Second follow up and baseline	-1.804	0.334	0.0001

HAMD Scores:

Table 16: Table showing Mean HAMD scores at base line, first and second follow ups

	Mean	Std. deviation	N
Base line	6.02	1.275	92
Follow up 1	5.75	0.750	92
Follow up 2	5.88	0.768	92

Mean scores of Depression were found to be 6.02 (SD±1.275) at base line, 5.75(SD±0.750) in first follow up and 5.88(SD±0.768) at second follow up.

Table 17: Table showing results of repeated measure ANOVA performed on mean HAMD scores

ANOVA Table	Sum of squares	df	Mean squares	F	Sig.
Between groups	3.399	2	1.699	2.081	0.128
Within groups	9555.710	273			
Subjects	89.582	91			
Error	148.601	182	0.816		
Total					

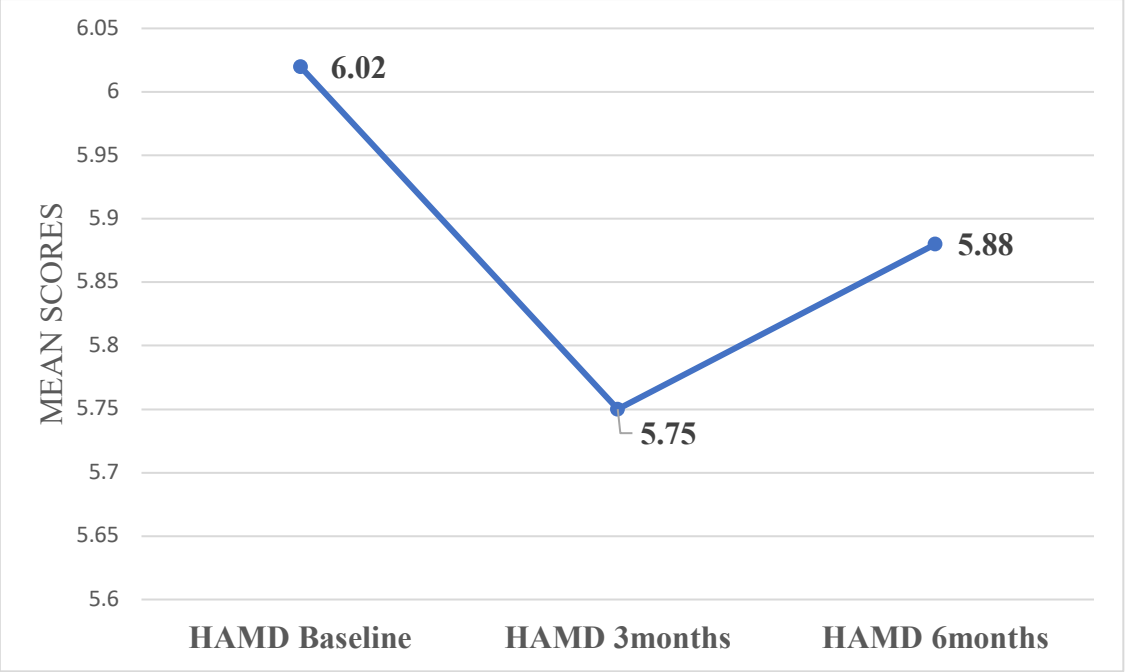

Figure 14: Shows the mean scores of Hamilton rating scale for depression (HAMD SCORES) at various phases (baseline,3months,6month follow-up

Table 18: Table showing results of post hoc analysis done on mean HAMD scores

Test	Mean difference	Std. error	Sig.
Baseline and first follow up	0.272	0.150	0.073
First follow up and second follow up	0.130	0.097	0.181
Second follow up and baseline	0.141	0.146	0.337

Above table shows the results of repeated measure ANOVA performed on AES scores. Results showed that the F (2,182) value found to be 2.081 with a p value of 0.128 (>0.05) which is not statistically significant. Post hoc analysis with pair wise comparison was done. Post hoc pair wise comparison showed a decrease in mean HAMD score between initial assessment and follow up assessment 3months later which is statistically significant with a p value of 0.073 (<0.05). when scores at 3 months and 6 months were compared there is an increase in scores which is statistically insignificant with a p value of 0.181 (>0.05) and when scores at initial assessment and score at 6 months follow up were compared the decrease in scores were seen which is statistically insignificant with p value of 0.337(>0.05). Therefor the results for the ANOVA indicate that there is no time effect for depression in first episode schizophrenia patients.

Table 19: Table showing Mean GAF scores at base line, first and second follow ups

	Mean	Std. deviation	N
Base line	78.91	4.506	92
Follow up 1	80.00	3.640	92
Follow up 2	80.43	3.266	92

Mean scores of Functioning were found to be 78.91 (SD±4.506) at base line, 80(SD±3.640) in first follow up and 80.43(SD±3.266) at second follow up.

Table 20: Table showing results of repeated measure ANOVA performed on mean GAF scores

ANOVA Table	Sum of squares	df	Mean squares	F	Sig.
Between groups	113.043	2	56.522	7.748	0.01
Within groups	1756813.043	273			
Subjects	864.478	91			
Error	1327.623	182	7.295		
Total					

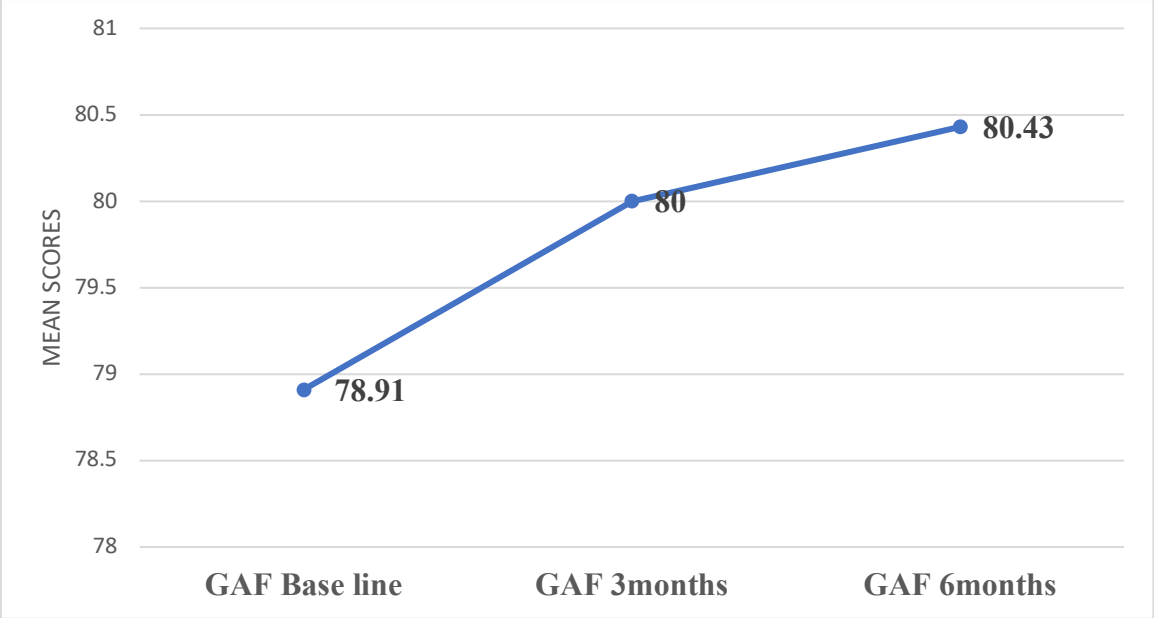

Figure 15: Shows the mean scores of Global Assessment of Functioning (GAF SCORES) at various phases (baseline, 3months,6month follow-up)

Table 21: Table showing results of post hoc analysis done on mean GAF scores

Test	Mean difference	Std. error	Sig.
Baseline and first follow up	1.087	0.465	0.02
First follow up and second follow up	0.435	0.229	0.06
Second follow up and baseline	1.522	0.454	0.001

Above table shows the results of repeated measure ANOVA performed on GAF scores. Results showed that the F (2,182) value found to be 7.748 with a p value of 0.01(<0.05) which is statistically significant. Which imply that difference between the means of AES at 3 levels of observation is significant. As the difference between the mean GAF scores at 3 levels of observation is significant, post hoc analysis with pair wise comparison was done.

Post hoc pair wise comparison showed a decrease in mean GAF score between initial assessment and follow up assessment 3 months later which is statistically significant with a p value of 0.02 (<0.05). when scores at 3 months and 6 months were compared decreasing trend followed which is statistically insignificant with a p value of 0.06(>0.05) and when scores at initial assessment and score at 6 months follow up were compared the decrease in scores were more and are statistically significant with p value of 0.001 (<0.05). Therefor the results for the ANOVA indicate a significant time effect for functioning in first-episode schizophrenia patients.

Correlation between apathy, depression and functioning:

Table 22: Table showing correlation between AES, HAMD and GAF scores

	R square	Co efficient	t	Sig.
GAF BL				
AES BL	0.419	- 0.728	7.173	0.001
HAMD BL	0.419	- 0.421	1.446	0.152
GAF FU1				
AES FU1	0.377	- 0.820	7.119	0.001
HAMD FU1	0.377	0.100	0.238	0.813
GAF FU2				
AES FU2	0.268	- 0.406	2.593	0.011
HAMD FU2	0.268	- 1.748	4.434	0.001

On applying multiple regression analysis on scores pf AES, HAMD and GAF scales at baseline, first follow up and second follow up it's found that at baseline correlation co efficient between AES and GAF is found to be – 0.728 which is statistically significant at p value of 0.001 (<0.005) but at baseline correlation coefficient between HAMD and GAF scores is found to be – 0.421 which is statistically insignificant with a p value of 0.152 (>0.05). This indicate that at baseline levels of

apathy is negatively and more strongly correlated with functioning than depression.

At first follow up correlation coefficient between AES and GAF is found to be – 0.820 which is statistically significant at p value of 0.001 (<0.05). The correlation co efficient between HAMD and GAF at first follow up is found to be 0.100 with a p value of 0.813 (>0.05) which is statistically insignificant. This indicates that at 3 months follow up apathy is correlated negatively and more strongly with functioning than depression.

At 6months follow up correlation coefficient between AES and GAF is found to be – 0,406 with a p value of 0.01 which is statistically significant. The correlation coefficient between HAMD and GAF at 6 months follow up is found to be – 1.748 with a p value of 0.001 (<0.05) which is statistically significant. This indicates that depression is negatively and more strongly correlated with functioning than apathy.

Discussion

Sociodemographic Characteristics: This study examined how apathy and sadness affected the functional outcome in 98 patients with first-episode schizophrenia.

With a mean age of 28.50 years and a standard deviation of 6.59 years, the 98 first-episode schizophrenia patients in this study had ages ranging from 18 to 60 years, which is similar to the mean age (28.018.5) of participants in a study by Siv Hege Lyngstad et al.

The mean age of the participants in another study conducted by JJ Simon in 2010 was 25.2 3.2 years. This similarity in the result of the sample's inclusion of first episode schizophrenia cases, whose average age of onset is 35 years, making the sample more youthful with a mean age of 28.5 6.059 years.

In the current study, there were 45% (n = 47) males and 52% (n = 51) females. It closely resembles the gender distribution in a study conducted in 2018 by Shiv Hege Lyngstad et al, which found 57.4% men and 41.6% women. Additionally similar to the gender distribution seen in the 2003 study by M. Kiang et al. This is a result of the prevalence of schizophrenia patients in both males and females throughout the diagnostic groupings used in the study, which are similar across both sexes.

77.6% of the subjects in the Shiv Hege Lyngstad et al. study were single. Robert R. Conley conducted a study. 61.4% of participants were never married and single. 65.8% of people in a research by Jeo J Dai were single, 27.9% were married, and 6.25% were divorced. 80% of the subjects in a study by Amy R. Korean were never married. In contrast to the studies previously mentioned, the current study found that 49% of participants were married, 42.9% were single, 6.1% were divorced, and 2% were widowed. This difference in marital status between Indian and western societies may be the result of cultural differences regarding the institution of marriage.

In the current study, 21 participants (21.4%) lacked a high school diploma; 22 participants (22.4%) had finished primary school; 21 participants (21.4%) had finished high school; 15 participants (15.3%) had finished higher secondary; and 19 participants (19.4%) had graduated. These findings concur with those of a 1993 study by Amy R. Korean and colleagues as well as a 2017 study by Jeo J. Dai and colleagues.

In contrast to the study conducted by Siv Hege Lyngstad et al in 2018 and the existing literature, 53.1% of those in the current study (n = 52) are employed, while 46.9% (n = 40) are unemployed. This difference is attributable to the study sample being drawn from a developing nation where it is necessary for people to begin working at a young age in order to support the family.

In contrast to the study conducted by Aman Kusum Jana et al. in India in 2020, it should be noted that in the current study 54.1% (n=53) of the participants were from rural areas, and 45.9% (n=45) were from urban areas. This is because patients who live close to the study site were recruited to ensure that every participant would attend follow-up appointments.

It should be noted that 92.9% of the participants in the current study (n = 91) have lower socioeconomic status, which contrasts with the available Indian literature. This is due to the study's location, a government tertiary care facility where people with lower socioeconomic status use most of the services, as well as the fact that India is a developing nation with a higher population of people with lower socioeconomic status. Surprisingly, the whole study population is from a nuclear family, illustrating the shift in Indian society from the joint family to the nuclear family. Since India is a secular nation, patients from many various religions are involved, although the majority are Hindus.

Illness Variables: In contrast to a study conducted in 2021 by Verdolini N. et al., who discovered that 283 participants had an 18% (n=51) family history of psychiatric disease, the current study indicated that 39.8% of participants (n=39) had such a history. There is no correlation between family history and functioning in the current study, which includes mostly rural and illiterate participants; this may be due to stigma and recall bias in the study population. This is similar to the study done by Verdolini N et al on patients with first episode psychosis; this is because first episode psychosis has a shorter duration of illness, which is associated

with less cognitive decline than in patients with chronic psychosis.

In contrast to a study conducted by Diana O. Perkins et al. in 2005, which included chronic schizophrenia patients and contributed more to the study's functional outcome, the current study's 58.2% (n = 57) and 41.8% (n = 41) disease durations were less than one year and one year, respectively.

AES Scores: The participants' levels of apathy were evaluated using the clinical version of the apathy evaluation scale at baseline, three months, and six months. Mean scores of apathy were found to be 28.53±3.690, 27.18±2.753 and 26.73±1.934.

In current Study mean apathy scores at baseline and follow up assessments similar to the mean apathy scores in a study done by Shiv Hege Lyngstad et al. This is due to similarities in both study groups in terms of age distribution, diagnosis which is first episode schizophrenia patients in present study and first episode psychosis patients in the study done by Siv Hege Lyngstad et al. In both the studies apathy was assessed by using AES clinician version.

The mean AES scores were in contrast to the apathy scores in a study done by George K. et al. this difference would be due to the difference in study population between the two studies where George K et al. recruited chronic schizophrenia patients in contrast to the present study where first episode schizophrenia patients were taken into study. As chronic schizophrenia patients will have more of cognitive deficits and more of residual symptoms the study has mean apathy scores higher than the current study this difference is considerable as in both studies apathy evolution scale clincian version was used to assess levels of apathy.

The mean AES scores obtain in the current study is in contrast to the study done by Carlos H F camargo et al. in which mean apathy was found to be 21.35 ±3.63 the difference is due to recruitment of Parkinson disease dementia patients which is the neurological disease then psychiatric disease.

At the three levels of assessment, there was a substantial variation in the means on the apathetic evaluation scale. It showed a decreasing tendency, which is attributable to the symptomatology going into remission with time and the help of medication and family. With p values of 0.001, 0.001, and 0.011 respectively, apathy substantially and adversely linked with functioning at baseline, three months, and six months. This is because patients with higher levels of apathy lack motivation, which contributes to deterioration in functioning.

HAMD Scores: The HAMD scale was used to assess participants for depression at baseline, three months, and six months. Mean scores of Depression was found to be were found to be 6.02±1.275, 5.75±0.750 and 5.88±0.768.

These scores are in contrast to the study done by Zezhi Li et al. In which study HAMD scores found to be 22.44 ± 5.13 this would be due to presence of active symptomatology in the study group in contrast to the current study in which patients in remission were taken into the study. Both the studies used HAMD scale for assessing level of depression.

With p values of 0.07, 0.181, and 0.337, the difference in the mean HAMD scores at baseline, first follow-up, and second follow-up was not statistically significant. It might be caused by depression developing at any stage of the illness, regardless of the symptoms. Despite depression scores being greater than at the second follow-up, there was no significant correlation between baseline and first follow-up depression and functioning. According to the results of earlier comparable investigations, depression is now inversely correlated with functioning at the second follow-up.

GAF Scores: Using the Global Assessment of Functioning Scale, levels of functioning in study participants were assessed at baseline, first follow-up at three months, and second follow-up at six months. The mean GAF scores were found to be increasing over follow ups, which is statistically significant with a p value of 0.01. This is due to the symptoms subsiding with time, which enhances functioning as the amount of functional loss caused by apathy over time decreased over time, along with the scores of apathy, which is the key contributor to functioning in the current study. Highest scores were noted on GAF scale at all levels of assessment this is due to the involvement of younger population in the study group and also of lesser duration of illness. Apathy is more strongly correlated with functioning than depression at baseline and 3 months follow up but depression is more strongly and negatively impacted functioning at 6 months follow up this may be due to post schizophrenic depression which may occur after patients gain insight into the illness which is after complete disappearance of the symptoms.

Strengths of Study

1. Study has a prospective design with regular follow up which allowed for better assessment of patients through course of study.

2. Study is one of the first studies of it's kind in India to assess role of apathy in functional outcome in first episode schizophrenia patients.

3. The study assessed the apathy which is a negative symptom most likely to be missed during clinical interview but contributes to functional loss.

4. Use of standardized scales for assessment of apathy, depression and functional assessment.

Limitations of Study

1. Remission was assumed through serial MSEs. No scales were used to ensure that patients were in remission during follow up assessments.

2. Patient's insight was not taken into consideration in the study.

3. Premorbid level of functioning is not taken into consideration in the study.

4. Extra pyramidal symptoms which mimics negative symptoms of schizophrenia were not taken into consideration in the study.

Future Recommendations

1. The study can be reproduced with a larger sample size and multi centre sampling to increase validity and generalizability.

2. Interventional studies with psychotherapeutic procedures targeted against negative symptoms can be done to know their effect on functioning.

Conclusion

Apathy which is a negative symptom in schizophrenia can occur even in early stages of illness and would predict short term and long term outcome of the patients. Depression which can also present in any stage of illness but can be treated with pharmacotherapy and due to fluctuating course would contribute less to the functional outcome than apathy.

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