# Social emotional cognition in depression

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## Abstract

**Background:** Depression is considered to have a detrimental effect on social cognition. Earlier studies on social cognition had methodological issues and are difficult to perform in a clinical setting. Till date no Indian study has used the Cog- state battery, Social Emotion Cognition Task (SECT) a computer assisted test.

**Aims and Objectives:** To study social emotion cognition of depressed patients in comparison with age and gender matched healthy controls. We also aim to study the differences between genders and the effect of severity of illness.

**Methodology:** Seventy two patients with depression were included in the study along with 72 healthy controls. HAM-D and SECT test was administered. The data so obtained was uploaded onto the cog-state website and results of correct response, errors and speed of response were analyzed.

**Results:** There was a significant difference in the correct responses between cases and healthy controls ($p<0.001$). The correct responses and HAMD score showed a negative correlation ($r=-0.48$, $p=0.00$). HAMD score predicts SEC ($B=-0.44$, $p=0.000$). Age is associated with more severe depression and poorer SEC scores ($r=-0.48$, $p=0.003$).

**Conclusion:** This study showed that SEC was significantly impaired in patients with depression and gender is not a predictor of it. The severity of depression impaired SEC.

**Keywords:** social emotional cognition, social emotional cognition test (sect), depression, cog-state, ham-d

## 1. Introduction

Patients with depression have changes in interpersonal functioning like reduction in social and leisure activities [1]. They also experience difficulties in maintaining social and family relationships [2]. The broad term social emotion cognition (SEC) describes a focus on the processes that help in understanding the emotions and intentions of others and the method of interacting with others. Analyzing social emotion cognition helps to estimate the level of social impairment in neuropsychiatric disorders [3].

Studies have shown that people with depression tend to remember negative emotions better than positive [4]. They also tend to recognize neutral faces as sad and do not recognize happy face [5]. A study comparing social cognition in patients with major depressive disorder, fronto-temporal dementias and controls showed that social cognition was impaired in depression [6].

This study aims to assess the domain of social cognition in patients with depression using the Cog-State Social Emotion Cognition Task (SECT) and to compare them with healthy controls. This tool was chosen as it differentiates facial expressions, is easy to administer in clinical setting and has computerized online scoring which minimizes the rater errors. Further specific training is not required for administration and scoring.

## 2. Materials and Methods

This study was done in the psychiatry outpatient clinic of a tertiary care hospital in north Kerala. The ethical approval was obtained from the institution ethics committee. Drug naïve patients in the age group of 18 to 65 years who currently meet the DSM IV-TR criteria for major depressive disorder were included in the study after getting written informed consent. Age and sex matched controls with no present, past or family history of psychiatric illness were selected from relatives of patients attending internal medicine outpatient clinic. Patients with psychotic symptoms, bipolar disorder, other major mental disorders, organic mental disorders, cerebro-vascular accidents, head trauma and visual impairment were excluded.

The first 200 patients were interviewed for presence of major depressive disorder using the structured clinical interview for DSM IV- TR (SCID). Depressive symptoms were quantified using Hamilton Depression Rating Scale (HAM-D) and Social Emotion Cognition Task (SECT) was administered to these patients. Further 100 age and sex matched controls with no past or family history of psychiatric illness were assessed for axis I diagnosis using the structured clinical interview for DSM IV- TR (SCID). The SECT was also administered to age and sex matched controls that had no psychiatric illness or past history of psychiatric illness. The data of each sample thus collected was uploaded to the Cog-state research website for interpretive scores. Each case report thus downloaded contains subject information, test information and these results were further uploaded into statistical software, statistical package for social services (SPSS) version 20 for further analysis (Figure 1).
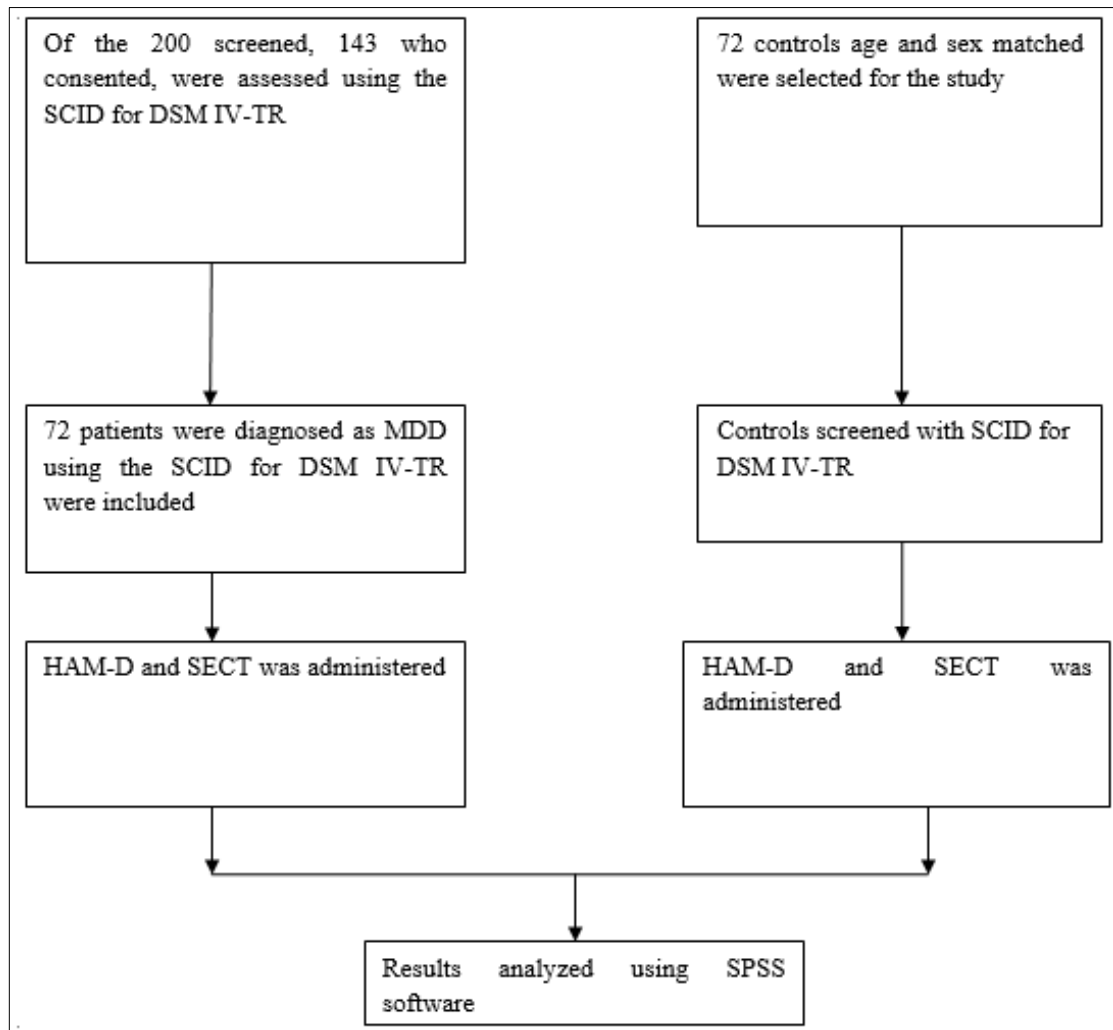
**Fig 1:** Procedural flow chart

## 3. Results

The study sample consists of 50 females and 22 males in both cases and the controls. The mean age in the cases was $39.25\pm13.77$ and in controls it was $35.46\pm13.72$. There was no significant age difference between the two groups. (p=0.063). The HAM-D score in cases was $18.80\pm6.32$ and in controls it was $3.61\pm1.76$. This was found to be significant (p=0.000).

The three outcome measures of SECT test are correct responses, number of errors and reaction time or speed of performance.

There was a lower score in correct responses in depressed patients ($18.72\pm7.53$ ) when compared to controls ($29.13\pm9.67$) which was statistically significant (t=- 7.49, p<0.001). Depressed patients also made more error responses ($26.89\pm7.71$) than controls ($18.77\pm9.67$) which was significant (t=5.56, p<0.001). The speed of response in patient group is more ($3.83\pm0.14$) than in controls is ($3.78\pm0.13$). Which was also statistically significant (t=2.17, p=0.031) (Table 1).

**Table 1:** SECT in depressives and controls

|  | Patient group(n=36) Mean(sd) | Control Group(n=36) Mean(sd) | T | P value |
|---|---|---|---|---|
| SECT correct | $18.72\pm7.53$ | $29.13\pm9.07$ | - 7.49 | 0.00 |
| SECT errors | $26.89\pm7.71$ | $18.77\pm9.67$ | 5.56 | 0.00 |
| Speed of Response | $3.83\pm0.14$ | $3.78\pm0.13$ | 2.17 | 0.031 |

When the SEC domains were compared between males and females both in cases and controls, there was no significant difference observed in correct score, errors or speed of processing. (Table 2 & 3)

**Table 2:** Comparison between males and females in patients

| Patient group | Male (N=11) | Females (N=25) | T | *p* value |
|---|---|---|---|---|
| SECT correct | $19.18\pm7.26$ | $18.52\pm7.70$ | 0.34 | 0.73 |
| SECT errors | $26.00\pm7.22$ | $27.28\pm7.95$ | -0.65 | 0.52 |

| | | | | |
|---|---|---|---|---|
| Speed of Response | 3.79±0.18 | 3.84±0.12 | -1.33 | 0.19 |

**Table 3:** Comparison between males and females in controls

| Control group | Male (N=11) | Females (N=25) | T | *p* value |
|---|---|---|---|---|
| SECT correct | 32.09±8.15 | 27.84±9.23 | 1.86 | 0.07 |
| SECT errors | 14.17±5.99 | 20.80±10.32 | -2.79 | 0.07 |
| Speed of Response | 3.71±0.16 | 3.80±0.11 | -2.81 | 0.06 |

A positive correlation was found between response time and the HAM-D scores (r=-0.24, p=0.039). Pearson's correlation was done between the age of cases and SECT scores, which showed a negative correlation of age with the SECT correct responses (r=-0.48, p=0.003) and positive correlation with error responses (r=0.47, p=0.004). However age did not correlate significantly with SECT correct responses (r=-0.14, p=0.06) or errors responses (r=0.05, p=0.73) among controls.

Pearson's correlation was done between age and HAM-D scores which shows a significant negative correlation (r=-0.331, p=0.005). Hence it was inferred that increasing age is associated with less severe depression and poor social emotional cognition.

## 4. Discussion
Social emotion cognition is a function of the frontal lobe which helps us process social information and recognize others emotions and act accordingly. A few studies which have looked at this aspect, have found social cognition deficits during an acute episode of depression which persisted even during remission, having an impact on the patient's psychosocial outcome. Studies done in other mental illnesses like schizophrenia and bipolar disorder have also yielded similar results [7].

In this study there were more female patients than males which only go to show that depression is more prevalent in females than males keeping is in line with other prevalence studies [2]. Studies in depression have shown that middle aged people are more affected and similar results were obtained in our study as well where most of the subjects in the cases were in that age group [8]. The HAM-D scores in controls of our study was 3.61±1.76 and a review done in healthy volunteers showed similar results of mean score of 3.4 [9]. In our study there was no statistical difference between males and females of both the test and control groups, though females had marginally underperformed. Studies have shown inconsistent results wherein a few are in favor of women as they had performed better in terms of ability to read expressions and nonverbal communication signals [10, 11]. In another study this difference was limited only to subtle facial expressions where females performed better but when both were presented with faces having highly expressive emotions, they scored the same [12].

This study shows that depression has a clear impact on social emotional cognition. An earlier study comparing social cognition in patients with major depressive disorder, fronto-temporal dementias and controls showed that social cognition was impaired in depression [6]. Further more severe the depression, the greater was the impairment of social cognition. Research shows that the severity of illness adversely affects not only the social emotion cognition but also negatively impacts the outcome of illness [13]. Further social cognition deficits can cause significant distress to the patient and caregiver and entails severe economic burden as well [14]. A study which examined the relationship between number of episodes, and duration of illness, with the brain activity during a facial emotion task has reported that there was no significant difference in the activity of amygdala [15]. This amygdala non-response has been found in another study which reported that amygdala-DLPFC is having reduced connectivity which was associated with the severity of illness [16]. This shows that the severity of illness causes structural and functional changes which may persist even after illness remission. Therefore early detection and prompt treatment of depression may decrease the chance of having these long lasting changes.

Our study has found that social emotion cognition declined with age. Another study has shown that age differences in social cognition are present in processing of facial emotion [17]. In the present study age and HAM-D score predicted social emotion cognition. This may be due to illness burden and other co-morbidities as well. The combined effect of age and severity of depression on social emotion cognition in depression has not been studied earlier and still remains an area for further research.

## 5. Conclusion
This study showed that social emotion cognition was significantly impaired in patients with depression and gender is not a predictor of it. The severity of depression had an effect on social cognition and age is an independent variable in predicting SEC in patients. Being the first Indian study, this will pave the way for future research. Further study with patients in remission and unaffected relatives to establish whether it is an endophenotype are required. The differential effect of medication versus cognitive interventions in improving SEC are suggested as an avenue for further research.

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