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Effects of subjective tinnitus on sleep quality and mini mental status examination scores

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Key-words. Subjective tinnitus; sleep quality; Mini Sleep Questionnaire (MSQ); Mini Mental Status Examination (MMSE) scores

Abstract. *Effects of subjective tinnitus on sleep quality and mini mental status examination scores. Objectives*: We investigated the effects of subjective tinnitus on sleep quality and Mini Mental Status Examination (MMSE) scores of participants.
Methods: The study group consisted of 15 patients, including 21 ears with tinnitus (6 bilateral, 9 unilateral). The control group consisted of 8 healthy patients with normal hearing and no tinnitus (16 ears). We assessed sleep quality using the Mini Sleep Questionnaire (MSQ) and mental health using the MMSE.
Results: Sleep delay (SD) was significantly higher in tinnitus patients (5.28 ± 2.23) compared to controls (3.25 ± 2.56) ($p = 0.018$). Subjective tinnitus loudness level (STLL) scores were higher and sleep quality was impaired in females, older patients, and patients with lower MMSE scores. Sleep quality was also worse in patients with longer tinnitus duration. In younger and well educated patients, MMSE scores were higher. Higher STLL scores and shorter tinnitus duration were associated with lower MMSE scores. Patients with newly developed tinnitus reported more disturbances and showed greater effects on mental and cognitive functioning.
Conclusion: In subjective tinnitus patients, sleep delay values increased. Long tinnitus duration and high STLL scores may affects patients' cognitive functions as shown by decreased MMSE scores. Furthermore, mental status changes in tinnitus patients were frequently overlooked.

Introduction

Tinnitus is defined as the perception of sound in the absence of any appropriate external stimulation. It is a common, bothersome, and difficult to evaluate complaint; in most cases it cannot be objectified. The incidence of tinnitus in the western world is approximately 10%. Recent theoretical developments favor a neurophysiological explanation for tinnitus in addition to a psychoacoustic model based on peripheral lesion in the cochlea or auditory nerve. In the neurophysiologic model, the processing of tinnitus signal plays a dominant role in its detection, perception, and evaluation.[1]

Approximately 60% of patients with tinnitus experience disturbances of the normal sleep pattern.[2] Recent studies found that when insomnia and depression are associated with tinnitus, there is decreased tolerance and increased discomfort with the tinnitus.[3]

Asplund[4] investigated the relationship of tinnitus to sleep and daytime sleepiness (DS) in a group of elderly men and women. The relative number of patients with tinnitus was not related to age in men, but increased with age in women. Among subjects with tinnitus, poor sleep and frequent waking were more common in both sexes, while difficulties in falling asleep after awakening at night were reported more often by women. DS was more common in subjects with tinnitus and its frequency was even greater in those with both tinnitus and poor sleep. There was no further increase in DS in men and women on sleep medication. Thus, DS in elderly persons with tinnitus may be due both to the tiring effect of the annoying sound itself but also to the negative effect of tinnitus on sleep.

The relationship between tinnitus and sleep quality is of importance. Approximately 1-2% of the population is severely disturbed by tinnitus; it has the potential to disrupt daily activities and sleep.[1] Additionally, tinnitus may affect mental health. There are few studies investigating tinnitus, sleep quality, and mental status. In the present study we investigated the effects of subjective tinnitus on sleep quality and Mini Mental

Status Examination (MMSE)[5,6] scores to assess cognitive functioning as related to subjective tinnitus. Sleep quality was evaluated with the Mini Sleep Questionnaire (MSQ).[3]

Materials and method

This prospective study was carried out in the Ear, Nose, and Throat (ENT) Department of Kırıkkale University Faculty of Medicine.

Subjects

The subjective tinnitus group was selected from patients examined in the Otolaryngology Department. This group consisted of 15 patients who were non-psychiatric and had a total 21 ears with tinnitus (6 bilateral, 9 unilateral). Eight patients were male and 7 were female. Mean age was 50.14 ± 11.80 years (range, 27.00 to 75.00). The control group consisted of 8 healthy patients with normal hearing levels (3 male and 5 female) who did not have tinnitus and were non-psychiatric (16 ears). Mean age of the control group was 46.75 ± 11.00 years (range, 27.00 to 64.00). Subjects in the control group were selected from healthy people in our hospital and clinics. All patients underwent ear, nose, and throat examinations, and their medical histories were reviewed.

Patients with tinnitus were included into the study only if the results of their ear, nose, and throat examination were normal. Audiological examinations were evaluated according to American National Standards Institute (ANSI-1969) standards.[7] Mean values of the study group showed slight hearing loss at 0.25 and 2.0-4.0 kHz and mild hearing loss at 6.0 kHz. Mean values of the control group showed slight hearing loss at 4-6 kHz.

None of the patients in the study and control groups had acoustic trauma or head trauma, signs or symptoms of current ear infection, obstructive sleep apnea, or known psychiatric diseases.

MSQ[7] was used to assess quality of sleep and MMSE[5,6] to evaluate mental health. All subjects gave written consent to participate.

Instrumentation

1. Questionnaire for tinnitus: The complaints of the tinnitus group were assessed using a questionnaire. The patients were asked to grade the severity of their subjective tinnitus loudness level (STLL) using a ten point scale, with 1 being very mild and 10 being very severe (0-2 very quiet, 3-7 intermediate loudness, 8-10 very loud).[8]

2. Audiologic examination: All patients were evaluated with 0.125 to 8.0 kHz audiologic examination using AC-40 Interacoustics Clinical Audiometer (Interacoustics, Assens, Denmark) and TDH-39 P C6 3918 Telephonics 296D 000-1 ear phone (Interacoustics, Assens, Denmark); impedancemetric tests were performed using the Interacoustics AZ 26 Impedance Audiometer (Interacoustics, Assens, Denmark).

3. MSQ: A 10-point MSQ focused entirely on sleep quality. This questionnaire consisted of questions concerning factors disturbing or affecting sleep, with responses indicated on a frequency scale of 1-7 (1 = never, 4 = sometimes, 7 = always). Mean scores in normal sleepers across different age groups was 2.1-2.5 with standard deviation of 1.3 or 1.4. Items of the 10-point MSQ are:1) Sleep delay (SD), 2) sleep awakenings (SA), 3) sleep medications (SM), 4) daytime sleep (DS), 5) morning fatigue (MF), 6) habitual snoring (HS), 7) morning awakening (MA), 8) morning headache (MH), 9) chronic fatigue (CF), and 10) restless sleep (RS) (see Appendix 1).[3]

4. MMSE: The MMSE[5,6] was administered to assess cognitive functioning. This test explores six cognitive domains: temporal and spatial orientation, short-term memory, computation, secondary memory, verbal attainment, and constructive ability. Healthy subjects have scores >23 (see Appendix 1).[5,6]

All steps of the study were planned and carried out according to the principles outlined in the Declaration of Helsinki.[9]

Statistical analysis

Statistical packet for SPSS (Version 8.0) was used for statistical evaluation. The difference between age, each of the MSQ results (SD, SA, SM, DS, MF, HS, MA, MH, CF, RS), and each of the pure tone audiometry thresholds (0.25-6.0 kHz) of study and control groups were analyzed by the Mann Whitney U Test. In the study group, the effects of gender, age, education, MMSE score, tinnitus duration, and tinnitus score on each of the MSQ items (SD, SA, SM, DS, MF, HS, MA, MH, CF, RS) were analyzed by linear regression analysis. The effects of gender, age, education, MMSE Score, active hand, and tinnitus duration on STLL in the study group were analyzed by linear regression analysis. The effects of gender, age, education,

Table 1

STLL and tinnitus duration of the study group*

Values	Study group		
	Mean ± standard deviation	**Minimum**	**Maximum**
STLL	7.23 ± 2.71	2.00	10.00
Duration of tinnitus (month)	24.47 ± 27.02	1.00	72.00

* STLL: Subjective Tinnitus Loudness Level.

STLL, tinnitus duration and active hand on MMSE Score in the study group were analyzed by linear regression analysis. A p value <0.05 was considered statistically significant.

Results

Table 1 shows STLL values and tinnitus of the study group. Mean STLL was 7.23 ± 2.71 (range 2.00 to 10.00) and mean tinnitus duration was 24.47 ± 27.02 (range 1.00 to 72.00) months. Pure tone audiometry results of the study and control groups are reported in Table 2. Table 3 shows age, MMSE Score, and MSQ results in study and control groups.

No significant difference in age and pure tone audiometry thresholds (0.25-6.0 kHz) was found between groups ($p>0.05$, Mann Whitney U Test) (Table 2).

The difference between each of the MSQ results in the study and control groups were analyzed using the Mann Whitney U Test. SD score of the study group (5.28 ± 2.23) was significantly higher than that of the control group (3.25 ± 2.56) ($p = 0.018$). There were no significant differences between other MSQ items ($p>0.05$) (Table 3).

In the study group, the effects of gender, age, education, MMSE Score, tinnitus duration, and tinnitus score on each of the MSQ items were analyzed by linear regression analysis (Table 4):

- In females, MF ($p = 0.041$) and MH ($p = 0.045$) items were significantly higher than males. SD, SA, DS, CF, and RS items were non-significantly higher in females than males.
- In older patients, SD, SA, DS, MF, MA, MH, CF, and RS items were non-significantly higher.
- In less-educated subjects, MA values were significantly higher ($p = 0.006$). In well-educated patients, SD, MF, MH, and CF items were non-significantly higher.
- In patients with lower MMSE Scores, SM ($p = 0.004$) was significantly higher; DS and CF values were non-significantly higher.
- In patients with longer tinnitus duration, SM ($p<0.0001$) and HS ($p = 0.002$) items were significantly higher; SD, SA, DS, MA, and RS items were non-significantly higher.
- In patients with higher STLL scores, SD, SA, SM, MF, and RS items were non-significantly higher.
- In females, in younger patients, in less-educated patients, and in patients with longer tinnitus duration, SM and HS values were significantly increased ($p<0.05$). In patients with

Table 2

Pure tone audiometry results of the study and control groups

Pure tone audiometry frequencies	Study				Control				P*
	Mean	**St Dev**	**Min**	**Max**	**Mean**	**St Dev**	**Min**	**Max**	
0.25 kHz	30.00	13.47	10.00	65.00	31.25	11.03	20.00	60.00	0.699
0.5 kHz	24.76	13.55	10.00	65.00	22.81	8.15	15.00	40.00	1.000
kHz	22.38	14.54	5.00	65.00	18.43	7.46	10.00	35.00	0.511
kHz	26.66	16.98	0.00	70.00	18.43	9.25	5.00	40.00	0.075
kHz	39.04	18.88	0.00	75.00	34.68	27.83	15.00	95.00	0.127
6.0 kHz	45.75	21.10	5.00	85.00	40.62	28.74	10.00	110.00	0.199

*: p value according to Mann Whitney U Test.

Table 3
Age, MMSE score, and MSQ results of Group 1 and 2*

	Groups								p
	Group 1 (study)				Group 2 (control)				
	Mean	**St Dev -**	**Minimum**	**Maximum**	**Mean**	**St Dev -**	**Minimum**	**Maximum**	
Age	50.14	11.80	27.00	75.00	46.75	11.00	27.00	64.00	0.282
MMSE score	21.71	2.58	15.00	26.00	22.87	3.20	18.00	29.00	0.278
MSQ items*									
SD	5.28	2.23	1.00	7.00	3.25	2.56	1.00	7.00	0.018
SA	4.47	2.29	1.00	7.00	3.62	2.41	1.00	7.00	0.290
SM	1.57	1.20	1.00	4.00	1.00	0.00	1.00	1.00	0.068
DS	2.28	1.52	1.00	4.00	2.50	1.54	1.00	4.00	0.670
MF	3.85	2.41	1.00	7.00	3.25	2.04	1.00	7.00	0.449
HS	3.42	1.80	1.00	7.00	2.87	2.15	1.00	7.00	0.323
MA	4.28	2.10	1.00	7.00	2.87	2.65	1.00	7.00	0.063
MH	2.71	1.52	1.00	4.00	2.12	1.50	1.00	4.00	0.243
CF	4.42	1.96	1.00	7.00	4.75	2.04	1.00	7.00	0.609
RS	3.57	1.96	1.00	7.00	2.87	2.15	1.00	7.00	0.266

*SD: Sleep Delay, SA: Sleep Awakenings, SM: Sleep Medications, DS: Daytime Sleep, MF: Morning Fatigue, HS: Habitual Snoring, MA: Morning Awakening, MH: Morning Headache, CF: Chronic Fatigue, RS: Restless Sleep.
p value acccording to Mann Whitney U Test.

lower MMSE scores, SM was significantly increased ($p < 0.05$) (Table 4).

In the study group, the effects of gender, age, education, MMSE Score, dominant hand, and tinnitus duration on STLL were analyzed by linear regression analysis (Table 5). All differences were not statistically significant. STLL scores were higher in females, in older patients, in less-educated patients, and in patients with lower MMSE scores. In the early stages of tinnitus, STLLs were higher; and as tinnitus duration increased, STLL scores were lower. In right handed patients (with left cerebral hemisphere dominance), STLLs were lower; in left handed patients (with right cerebral hemisphere dominance), STLLs were higher.

In the study group, the effects of gender, age, education, STLL, tinnitus duration, and dominant hand on MMSE score were analyzed by linear regression analysis (Table 6). All differences were not statistically significant. In males, in younger patients, and in well educated patients, MMSE scores were higher. As STLL scores increased and tinnitus duration decreased, MMSE scores decreased. In right handed patients (with left cerebral hemisphere dominance), MMSE scores were lower; in left handed patients (with right cerebral hemisphere dominance), MMSE scores were higher.

Discussion

Sleep disturbances are a factor that strongly predicts decreased tolerance to tinnitus. In a previous study, polysomnography was performed on 26 patients with tinnitus and sleep disturbances. In 17 of 26 patients, polysomnography revealed a pathological sleep analysis: 10 patients were diagnosed with obstructive sleep apnea syndrome and 4 with insomnia and an increased index of arousals as well as a reduction of deep sleep- and REM-phases. Pathological movements of the legs were seen in 3 cases. Six of 9 patients with normal sleep during the entire night displayed a prolonged latency period before falling asleep.[2]

Erlandsson and Holgers[10] investigated relationships between the perceived severity of tinnitus, audiometric data, age, gender, and non-disease specific health-related quality of life measured with the The Nottingham Health

Table 4

Linear regression analysis of the factors on MSQ Items in the study group

	MSQ Items*																			
	SD		**SA**		**SM**		**DS**		**MF**		**HS**		**MA**		**MH**		**CF**		**RS**	
	Beta	**p**	**Beta**	**p**	**Beta**	**p**	**Beta**	**p**	**Beta**	**p**	**Beta**	**p**	**Beta**	**p**	**Beta**	**p**	**Beta**	**p**	**Beta**	**p**
Gender	-0.316	0.380	-0.258	0.494	0.697	**<0.0001**	-0.284	0.401	-0.719	**0.041**	0.916	**<0.0001**	0.538	0.055	-0.590	**0.045**	-0.638	0.067	-0.097	0.781
Age	0.499	0.169	0.240	0.515	-0.418	**0.001**	0.521	0.131	0.218	0.488	-0.669	**0.002**	0.058	0.818	0.197	0.458	0.665	0.053	0.110	0.746
Education	0.052	0.897	-0.347	0.419	-0.492	**<0.0001**	-0.013	0.973	0.430	0.246	-0.886	**0.001**	-0.967	**0.006**	0.019	0.950	0.173	0.635	-0.277	0.487
MMSE score	0.249	0.520	0.451	0.278	-0.347	**0.004**	-0.184	0.614	0.142	0.681	0.364	0.081	0.417	0.153	0.562	0.074	-0.017	0.962	0.649	0.106
Tinnitus duration	0.218	0.504	0.195	0.571	0.679	**<0.0001**	0.011	0.971	-0.229	0.436	0.646	**0.002**	0.270	0.262	-0.131	0.594	-0.014	0.961	0.443	0.181
STLL score	0.101	0.756	0.020	0.953	0.077	0.360	-0.002	0.995	0.041	0.886	-0.014	0.931	-0.086	0.715	-0.278	0.269	-0.339	0.262	0.257	0.424

*SD: Sleep Delay, SA: Sleep Awakenings, SM: Sleep Medications, DS: Daytime Sleep, MF: Morning Fatigue, HS: Habitual Snoring, MA: Morning Awakening, MH: Morning Headache, CF: Chronic Fatigue, RS: Restless Sleep.

Table 5
Linear regression analysis of factors related to STLL scores in the study group

	STLL scores	
	Beta	**p**
Gender	-0.073	0.860
Age	0.267	0.491
Education	-0.299	0.446
MMSE score	-0.233	0.518
Active hand	0.153	0.698
Tinnitus duration	-0.187	0.650

Table 6
Linear regression analysis of factors related to MMSE scores in the study group

	MMSE score	
	Beta	**p**
Gender	0.146	0.676
Age	-0.030	0.927
Education	0.485	0.129
STLL score	-0.167	0.518
Tinnitus duration	-0.392	0.247
Active hand	0.041	0.902

Profile (NHP). The stepwise regression model used explained 37.8 percent of the variance in the erceived severity of tinnitus; significant predictors were "Emotions", "Sleep", and "Pain", three of the six dimensions of the NHP I (topics related to health status).

Folmer and Griest[11] investigate the effects of insomnia on tinnitus severity. Forty-three of 174 patients reported difficulty sleeping. Reported loudness and severity of tinnitus were significantly greater for this group than for patients reporting difficulty sleeping sometimes or never. The relationship between sleep disturbance and tinnitus severity became more pronounced with the passage of time. Insomnia is associated with greater perceived loudness and severity of tinnitus.

Prevalence and characteristics of tinnitus in sleep bruxism patients were evaluated. Tinnitus frequency was higher in patients with sleep bruxism and chronic facial pain. Myofacial pain, number of areas painful to palpation in the masticatory and cervical muscles, higher levels of depression, and tooth absence without prosthetic replacement were more frequent in patients with tinnitus.[12]

In the present study, we investigated the effects of subjective tinnitus on sleep quality and MMSE scores. Sleep delay (SD) was significantly higher in subjective tinnitus patients than in controls. Since the patients perceive their tinnitus more in quiet environments, this may cause greater sleep delay values. We might recommend listening to soft music in the bedroom to alleviate this.

In the subjective tinnitus group, MSQ items were non-significantly higher and sleep quality non-significantly impaired among females, older patients, well-educated patients, and patients with lower MMSE scores.

In females, in younger patients, in less-educated patients, and in patients with longer tinnitus duration, SM usage and HS values were significantly increased. In patients with lower MMSE scores, SM usage significantly increased ($p < 0.05$) (Table 4). SM usage was negatively associated with mental status and MMSE scores. It is possible that sedative side-effects reduced the attention of the patients resulting in lower MMSE scores. Also, patients with longer tinnitus duration may have difficulties in falling a sleep and may be more likely to use sleep medication for his purpose.

In females, MF values were significantly higher than males ($p = 0.041$). In the Turkish population, females may be tired because of the combined responsibility of a full time job and housework.

In less-educated subjects, morning awakening values were significantly higher ($p = 0.006$). A possible explanation might be that subjects with less educated may have worse sleep hygeine, such as allowing adequate time for sleeping at night; therefore, they may wake up early in the morning without enough sleep. House conditions and social media may also affect the subjects' sleeping conditions and comfort.

In patients with longer tinnitus duration and higher STLL scores, poor sleep quality was observed. These results were not significant, but we did observe a tendency towards lower sleep quality results with increased STLL scores.

Alster *et al.*[3] investigated the prevalence and severity of sleep disturbance in chronic tinnitus patients. MSQ scores for sleep disturbance were found to be higher than those of normal controls in 77% of patients. Highest MSQ scores in tinnitus patients with a sleep complaint were for delayed sleep, morning awakenings, mid-sleep awakenings, morning fatigue, and chronic fatigue. In contrast, a complaint of excessive daytime sleep was not common. The self-rated severity of the tinnitus was greater in subjects with higher sleep disturbance scores. Self-rated depressive symptomatology also correlated strongly with sleep disturbance. Retrospective examination of sleep records and polysomnographic data for 10 patients with a complaint of chronic tinnitus revealed a combined effect for the tinnitus condition when associated with another conventional sleep disorder. In spite of the common complaint of sleep disturbance in tinnitus, only a minority seek medical help.

In the tinnitus group of our study, STLL scores were 7.23 ± 2.71, corresponding to an intermediate loudness level on the A.T.A. classification.[8] In females, older patients, less-educated patients, and patients with lower MMSE scores, STLL scores were non-significantly elevated. In the early stages of tinnitus, STLL scores were higher; as tinnitus duration increased, STLL scores were lower. In right handed patients (with left cerebral hemisphere dominance), STLL scores were lower, and in left handed patients (with right cerebral hemisphere dominance), STLL scores were higher.

In a study by Folmer *et al.*,[13] tinnitus severity correlated strongly with patients' degree of sleep disturbance. The self-rated (on a 10-point scale) loudness of tinnitus correlated with tinnitus severity and sleep disturbance. The severity of chronic tinnitus correlated with the severity of insomnia, anxiety, and depression. In the present study, as in patients with higher STLL scores, poor sleep quality was observed; thus our results are similar to those of Folmer *et al*.[13]

In a study by Rosenberg *et al.*,[14] melatonin was demonstrated to be useful in the treatment of subjective tinnitus. Among subjects reporting difficulty sleeping attributable to their tinnitus, 46.7% reported an overall improvement after melatonin compared with 20.0% for placebo ($p = 0.04$). There was also a statistically significant difference in improvement with melatonin for those patients with bilateral tinnitus compared with those with unilateral tinnitus ($p = 0.02$). Patients with high Tinnitus Handicap Inventory (THI) scores and/or difficulty sleeping are most likely to benefit from melatonin.

In our study, MMSE scores were non-significantly higher in males, younger patients, and well educated patients. As STLL scores increased and tinnitus duration decrease, MMSE scores non-significantly decreased. This shows that patients complaints were greater and mental and cognitive functions more likely to be affected in patients with new-onset tinnitus. In right handed patients (with left cerebral hemisphere dominance), MMSE scores were lower; in left handed patients (with right cerebral hemisphere dominance), MMSE scores were higher.

Attention and other psychological factors are important in the understanding and treatment of tinnitus. Many treatments of chronic tinnitus have been proposed and implemented. Today, cognitive-behavioral treatment is regarded as an important part of an integrative therapy which may be combined of counseling, relaxation therapy, instrumentation (hearing aid, tinnitus masker, tinnitus instrument, tinnitus noiser), and pharmacological tools (lidocaine, neurotransmitters).[1]

Conclusion

In subjective tinnitus patients, sleep delay values as measured by the MSQ were increased. We may recommend listening to soft music in the bedroom while sleeping to overcome this. Long tinnitus duration and high STLL scores may affects patients cognitive functions as demonstrated by decreased MMSE scores. Mental status in tinnitus patients should be kept in mind and careful evaluation should be performed if necessary. Stress management and relaxation measures may be helpful for chronic tinnitus patients.

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APPENDIX 1: Mini Sleep Questionnaire (MSQ)[3]
MINI SLEEP QUESTIONNAIRE (MSQ)

Name - Surname: **Telephone:** **Date:**

1. Have you had difficulties in falling asleep? (SD: Sleep Delay)
a) Never
b) Sometimes
c) Always

2. How often have you awakened at night? (SA: Sleep Awakenings)
a) Never
b) Sometimes
c) Always

3. Do you use sleeping pills? (SM: Sleep Medications)
a) Never
b) Sometimes
c) Always

4. Do you feel excessively sleepy during the daytime? (DS: Daytime Sleep)
a) Never
b) Sometimes
c) Always

5. Do you wake up in the morning tired? (MF: Morning Fatique)
a) Never
b) Sometimes
c) Always

6. Do you snore during sleep? (HS: Habitual Snoring)
a) Never
b) Sometimes
c) Always

7. How often have you awakened too early in the morning without being able to fall asleep again? (MA: Morning Awakening)
a) Never
b) Sometimes
c) Always

8. Do you wake up in the morning with headaches? (MH: Morning Headache)
a) Never
b) Sometimes
c) Always

9. Do you constantly feel tired? (CF: Chronic Fatique)
a) Never
b) Sometimes
c) Always

10. Do you have restlessness in sleep? (RS: Restless Sleep)
a) Never
b) Sometimes
c) Always

APPENDIX 2: Mini-mental Status Examination (MMSE)[5,6]
Mini-mental Status Examination

ORIENTATION (Total 10 points)
What year is it?.....……..……( )
What season is it?…….……..……( )
What month is it?.....…….……..( )
What date of the month is it?.....( )
What day of the week is it?.....…….……..…( )

Which country are we living in?...……..…( )
Which city are you currently in?…….( )
What district are you in?...…….....…( )
What building are you currently located in?……..…….....( )
What floor are you located on?.....( )

REGISTRATION MEMORY (Total 3 points)
Listen carefully to three names I will tell you and repeat after I finish. (Table, flag, clothes) (20 sec duration is allowed)
Every correct answer is 1 point.....( )

ATTENTION AND COUNTING (Total 5 points)
Count back from 100 by subtracting 7. Continue until I say "stop"
Each correct process is 1 point (100, 93, 86, 79, 72, 65).....( )

RECALL (Total 3 points)
Do you remember the words you repeated above? Say the remembered ones correctly.
(table, flag, clothes)…….....( )

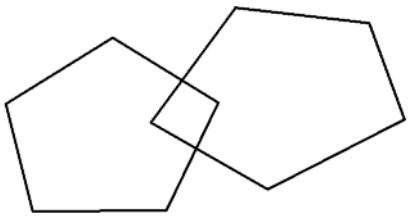
LANGUAGE (Total 9 points)
a) What are the names of these objects you see? (watch, pencil) (2 points) (Allow 20 seconds)
…….( )

b) Now, listen carefully to the sentence I will tell you; and after I finish, you repeat it. “If and but, I do not want” (Allow 10 seconds) (1 point) ……..…..……..…( )

c) Now I want you to do something: Please listen carefully to me and do what I tell you. Take the paper on the table by your right/left hand. Using both hands, fold it in two, and put it to the ground.” (Total 3 points, time given is 30 seconds, each correct procedure, 1 point.……..( )

d) Now, I will give you a sentence. You read it and do what is told in the writing (1 point)

CLOSE THE EYES (Write on the back of the paper)……..……..( )

e) Now, write a meaningful sentence on the paper I will give you (1 point)…….....( )

f) Draw the same of the figure I will show you (on the back paper) (1 point)…….( )