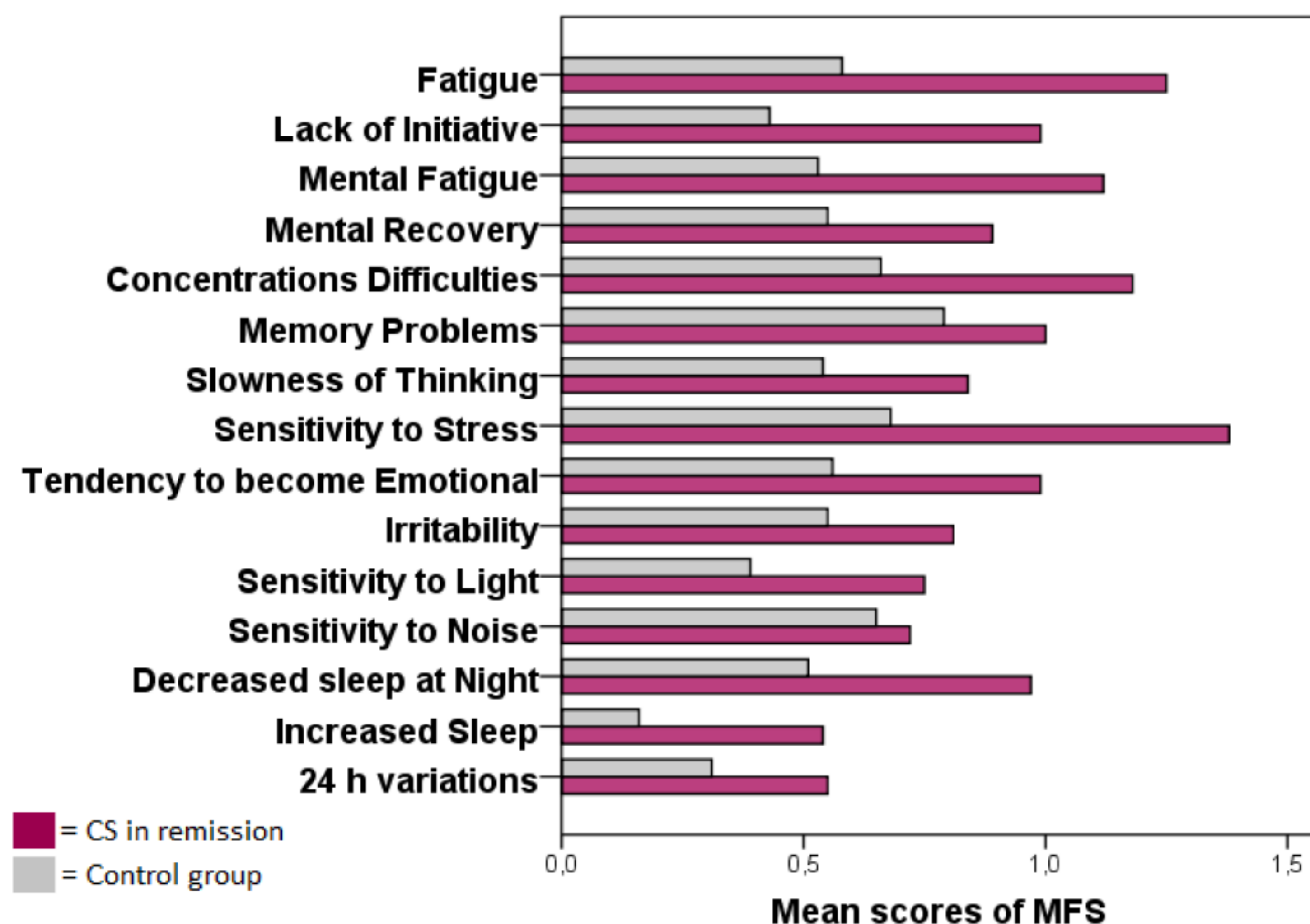


# Mental fatigue and executive dysfunction in patients with Cushing's syndrome in remission

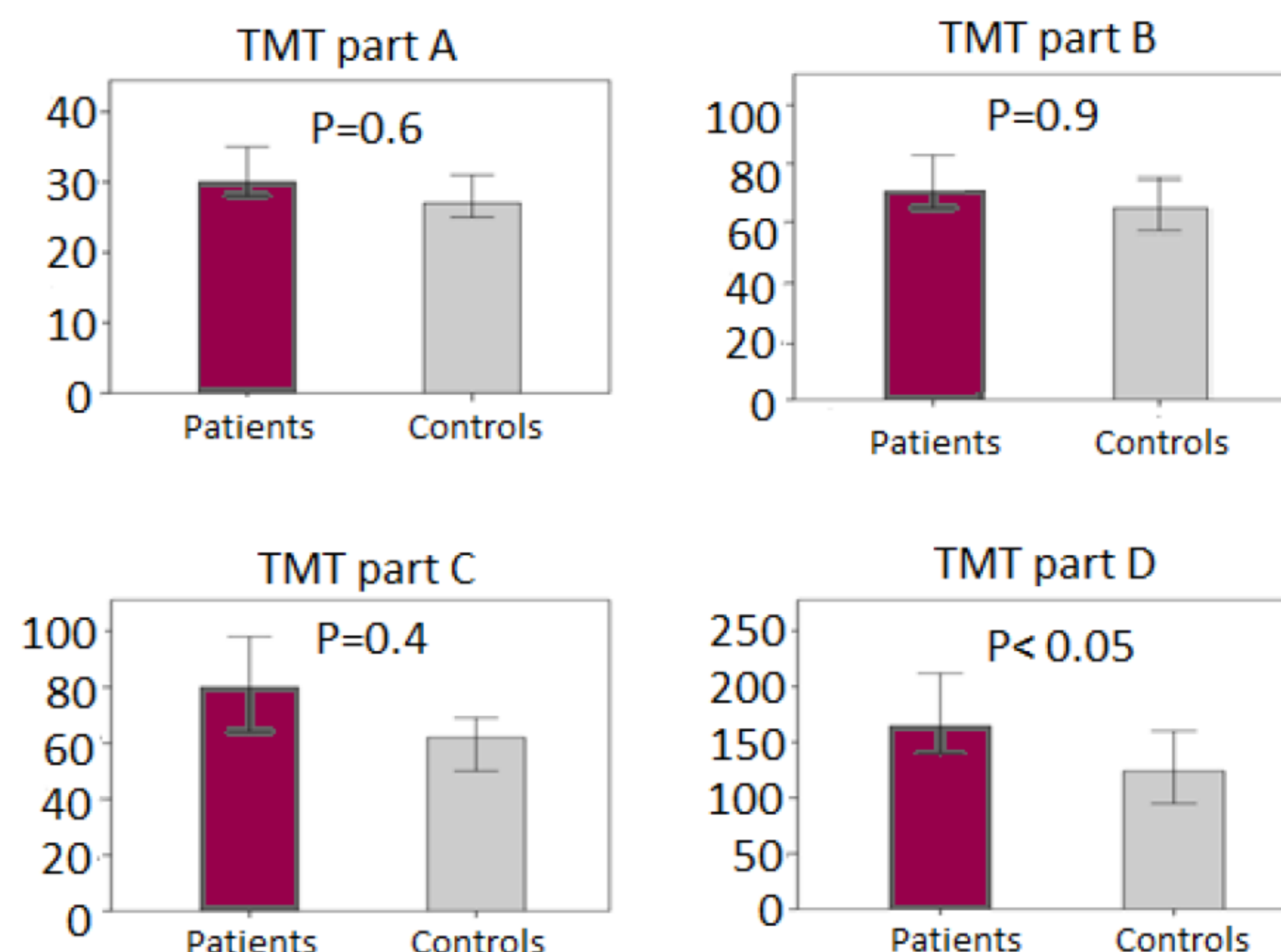
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**Fig 1.** Mean scores of Mental Fatigue Scale (MFS) for patient and control group.



**Fig 2.** Median time (seconds) on Trail Making Test (TMT) part A, B, C, D for patient and control group.



## Background

Patients with Cushing's syndrome (CS) in remission often suffer from impaired quality of life and cognitive dysfunction.

Mental fatigue is characterized by mental exhaustion which appears especially during sensory stimulation or following mentally strenuous tasks. Other typical features are long recovery time for restoration of mental energy, irritability, impaired memory and concentration, and sensitivity to stress, light and noise.

## Aims

The aims of this study were to:

- investigate the occurrence of mental fatigue by using the mental fatigue scale (MFS) in patients with CS in remission.
- examine whether the more demanding parts C and D of the trail making test (TMT) are more sensitive, compared to the conventional parts A and B, in evaluation of executive functions.

## Methods

This was a cross-sectional study including 51 patients with CS in remission and 51 controls, matched by age, gender and education. All subjects completed the self-administrated MFS and performed all four parts of the TMT.

**Mental Fatigue Scale (MFS)** is a 15-items self-rating scale that covers the most common symptoms of mental fatigue (Fig 1). A rating of "0" reflects normal function, "1" indicate a problem, "2" a pronounced symptom and "3" a maximal symptom.

**Trail Making Test (TMT)** evaluates speed of processing, visual search and executive function.

- Part A:** draw lines and connect consecutively 25 numbers in ascending order.
- Part B:** alternate from numbers to letters while connecting them.
- Part C:** months were added (i.e. 1-A-January, 2-B-February etc.)
- Part D:** days of the week were added and the order of letters and digits were switched (i.e. A-1-January-Monday, B-2-February-Tuesday etc.)

## Results

The age (mean±SD) of patients and controls was 52.5±14.6 yr and 53.6±13.9 yr (P=0.7), respectively. The median time in remission was 12 (4-18) yr (Table 1).

The patients had higher scores on all components of the MFS, indicating worse outcome, except for sensitivity to noise. The mean total score on the MFS was 13.5±7.4 in the patients compared to 7.8±4.9 (P<0.001) in controls (Fig. 1).

After adjustment for fatigue, depression and anxiety the patients performed worse on part D of the TMT (P<0.05) but not on parts A, B and C (Fig. 2).

**Table 1.** Demographic characteristics of patient and control group.

Sociodemographics	Patients (n=51)	Controls (n=51)	P
Age at follow-up (yr)	52.5±14.6	53.6 ± 13.9	0.7
Age at diagnosis (yr)	36.4±13.6		
Duration of remission (yr)	12 (4-18)		
BMI	27.0±6.6	25.9±5.2	0.4
Education level (%)			0.9
i. Elementary school	22	22	
ii. Upper secondary education	51	55	
iii. University education	27	23	
Smoking habits (%)			0.9
i. Nonsmoker	58	53	
ii. Ex-smoker	32	37	
iii. Smoker	10	10	
Marital status; married (%)	69	71	0.9
Employment (%)			0.09
i. Full-time	34	51	
ii. Part-time	30	20	
iii. Sick leave/disability pension	10	0	
iv. Retirement	26	29	

## Conclusions

Mental fatigue is common in patients with CS in remission. The most demanding part of the TMT, part D, is more useful to capture cognitive deficits in patients with CS in remission compared to the conventional parts A and B.

