



**ASSESSMENT OF PSYCHOMOTOR FUNCTION BY CRITICAL FLICKER FUSION
FREQUENCY: CORRELATION WITH AGE.**

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Abstract

Background: Critical flicker fusion frequency (CFFF) is accepted indicator of the cortex arousal level. It is used as an indicator of physical human fatigue, mental workload and cognitive function as well. In medicine and physiology, experimental evidences demonstrated the relationships between the CFFF level and individual human attributes like age, sex, intelligence and job experience. As age advances several physiological changes occur in the body, both physical and psychomotor changes. In this study, CFFF was used as an objective test to assess cognitive function to study age related changes of psychomotor skills. **Aim:** The present study was aimed to assess correlation between CFFF and age. **Materials and methods:** CFFF was measured in 70 adult normal subjects, both male and female, by CFFF measuring instrument, an in-house built standard electronic module using sweep-gen software. **Results:** r-value is 0.110986 for 40 – 80 years age group (Group – I) and r-value is -0.33074 for 60 -80 years age group (Group – II). **Conclusion:** CFFF values increased with age in normal adults of 40-60 years age group but CFFF decreased with age in elderly age group(>60 years) suggesting an impairment of psychomotor skills in old age.

Keywords: Critical flicker fusion frequency, normal adults, cognitive aspects of ageing

INTRODUCTION

Critical flicker fusion frequency (CFFF) is the frequency at which an intermittent light stimulus appears to be completely steady to the observer (As defined by Encyclopedia of psychopharmacology). It is the frequency at which the lowest level of continuous flicker is perceived as steady source of light. The flickering light will reach the retina based on temporal processing of visual stimulus. Temporal resolution of flickering stimulus is often limited by brain, so CFFF is used to assess the Cognitive function, CNS arousal in neurology & pharmacology.^[1] Normal CFFF value is 35-40 Hz.^[2] If the frequency at which frames are displayed in a film falls below the CFFF, the image will be perceived as jerky. Sub threshold intermittent light is perceived as flicker, if the flicker frequency is increased the flickering gradually becomes less distinct until it is no longer perceived as flickering but as steady source of light.

As age advances along with physical changes, psychomotor changes do occur. Psychomotor function changes in elderly people has been a subject of debate^[3] so far. Automated psychomotor test battery (APT) is one of the psychomotor testing tools which includes CFFF test along with continuous attention test and choice

reaction time test. The sensitivity and validity of APT battery has been well established.^[4] It is a non verbal test which reflects the general intellectual ability of the

subjects unaffected by subject's background, education or learning.^[5] The current study was aimed to assess changes in psychomotor function by CFFF and its correlation with age.

MATERIALS AND METHODS

For this study 70 healthy subjects of 40-80 years age, both male and female were selected. The purpose of the study was explained to each subject and encouraged for voluntary participation and informed consent was taken from each subject. Ethical committee approval was obtained. Detailed medical and family history was recorded by a preformed questionnaire. Study was conducted in the morning hours between 8am – 10am at Narayana medical college, Nellore. Study group was divided into two based on age, Group I with subjects between 40 to 60 years age and Group II with subjects between 60 – 80 years of age.

SELECTION OF SUBJECTS

Inclusion criteria: 40-80 years age group subjects, both male and female, apparently healthy individuals.

Exclusion criteria: Subjects of Age <40 years, subjects with H/O Hypertension, diabetes, cardiovascular disorders, smoking, drug addiction.

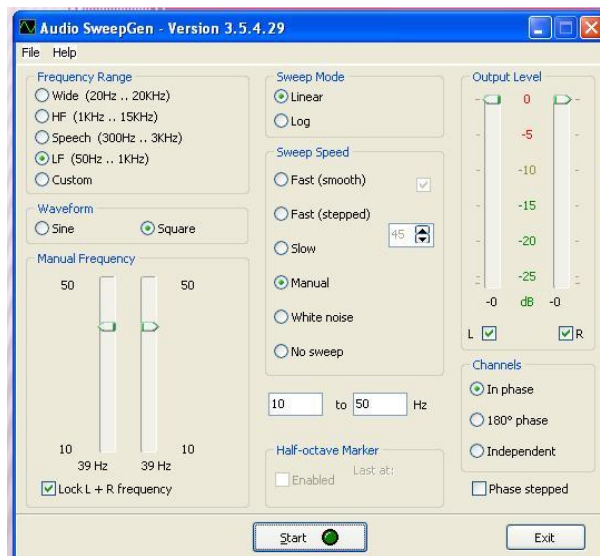
MATERIALS AND METHODS

Instrument

CFFF measuring instrument is a Portable device, in-house built LED based instrument. Monochromatic red LED light of wave length 630nm, fixed on white back ground is used as Flickering light source. Frequency adjustment done by software based variable frequency square wave oscillator (10-50 Hz). Frequency measured from the recorded data using audacity soft ware.



CFFF measuring instrument Portable device



Audio Sweep-Gen software used for the adjustment of frequencies.

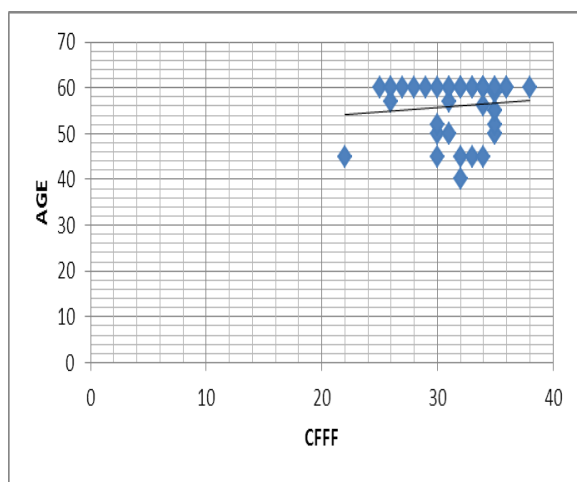
Method of testing

Subjects were tested in a minimally illuminated room, with the CFFF measuring device kept at a distance of 30cm. Subjects were properly instructed, asked to respond by lifting the hand and tested by increasing and decreasing the frequencies. When the frequency is increased, at one point the flickering stops and light is perceived as a steady source. If the frequency is decreased from higher levels at one point flickering appears. Both ascending and descending frequencies were recorded and the mean of the two is taken as CFFF.

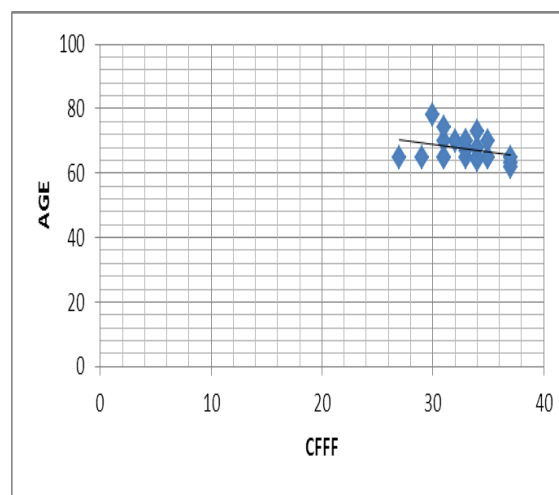
RESULTS

	GROUP - I	GROUP - II
MEAN CFFF	32.0652	33
MEAN AGE	56	67
r - value	0.110986	-0.33074

Group – I: AGE GROUP 40 – 60 yrs, Group – II: AGE GROUP 60 – 80 yrs.



Group – I



Group – II

DISCUSSION

Our study was designed to assess correlation between CFFF and age, which showed a negative correlation in elderly subjects. CFFF test is a subject friendly test especially for elderly people, who usually do not cooperate for cumbersome investigations. CFFF test is a simple test to perform but with high sensitivity and validity, which can be easily done by the elderly subjects too. So by performing this test we could assess the changes in psychomotor function with the advancement of age. Studies showed that in elderly, normotensive subjects, as SBP increases CFFF increases.^[6] Stimulation of retina with diffuse light increases the metabolic activity and retinal blood flow in healthy subjects which reflects the activity of central visual system.^[7] In prehypertension and hypertension, SBP negatively correlated with CFFF. Our study is consistent with the cross sectional community study done by Curren.S et.al,^[8] which showed negative correlation between age and CFFF in elderly people.

CONCLUSION

The positive correlation between CFFF and age in Group – I, shows that CNS arousal and cognition (psychomotor function) is not affected significantly up to 60 yrs of age, but beyond 60 yrs of age(Group – II) there is a decrease in psychomotor function.

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Conflict of interest: Nil.

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