SUMMARY
Caffeine is the most widely used psychoactive substance in the world. It is consumed in the form of tea, coffee, cola and chocolates. It is one of the three important derivatives of xanthine, others being theophylline and theobromine. It is the most powerful CNS and skeletal muscles stimulant. At a dose of 100 mg, it stimulates CNS at all levels. The onset of effects is often within 30 min of ingestion with peak effects in about 2 hours. Its stimulant effects are reflected by increased alertness, wakefulness and motor activity as well as stimulated neuronal activity. Being a psychoactive substance, caffeine has been found to be moderating performance on number of psychological tasks such as learning, memory, attention and other cognitive performance. However these effects have been found to be operating in interaction with number of psychological and organismic variables, including age, sex, fatigue, time of day, task difficulty, time and personality attributes such as impulsivity and extraversion. Sustained attention or vigilance has also been studied in relation to caffeine. Much research efforts suggest that caffeine seems to possess the capacity to reduce vigilance decrement but focussed more on the overall level of vigilance than on vigilance decrement.

The present study was planned to see the effect of caffeine on vigilance decrement and overall vigilance performance. Data
were obtained on 120 female subjects who were not smokers or addict of any other drug or habitual coffee or tea consumers. Bakan type two hours auditory cognitive vigilance tasks of various difficulty level/mental load i.e. low, moderate and high was prepared and used. Nestle’s instant coffee (having 5 mg/kg or 10 mg/kg body weight dose of caffeine) and decaffeinated coffee were given following double-blind procedure. Separate subjects were used for low and high dose. Each subject worked twice in placebo and caffeenated condition for two hours in the morning session. Dependent scores in the design were hits and false alarms. Being the context of Signal Detection Theory finally the dependent measures were as sensitivity ($d'$ - refers to the ability to detect the signal) and response criterion ($\beta$ - a measure of the cautiousness of the observer, a critical value of the sensory magnitude set up in advance). Analysis of variance was applied for analysing data after transforming due to heterogeneity of variance. Effect of dose using 120 subjects was verified in separate analysis. Placebo was separately compared with low and high dose, thus three separate analysis of $\beta$ and $d'$ were done.

The findings revealed that sensitivity was best when mental load was less and it decreased when task difficulty/mental load increased. It is in consonance with limited resource capacity
hypothesis. Moderate mental load evoked the best/cautious response criterion whereas in low as well as high mental load subjects observed risky (more false alarms) response criterion. It may be due to the posteriori judgement about the probability of signal. Caffeine's potency to improve sensitivity or response criterion was not as consistent as that of task difficulty. Low dose caffeine (5 mg/kg) decreased sensitivity in comparison to placebo. Whereas high dose of caffeine (10 mg/kg body weight) made subjects to observe risky criterion than low dose. On the whole response criterion was equally likely in placebo and low dose caffeine. Time variable influenced response criterion as it improved vigilance performance upto 90 min. when all subjects were under the influence of caffeine.

The findings converge on two complementary theoretical positions - one is limited resource capacity and another is moderate arousal hypothesis. Due to the multifactorial nature of experiment and some other inherent difficulties i.e. task variation, subjects' history of non-coffee users and lack of empirical work in using signal detection parameters the findings were less dependable both for sensitivity and response criterion. Therefore more studies are required to verify the role of caffeine in vigilance decrement.