
ABSTRACT

The research work in this paper is on effect on coffee on the growth of microorganism. Caffeine is the active component of coffee. It is a plant alkaloid which is found in more than 60 plant species just like *Coffea arabica* (Coffee), *Thea sinensis* (Tea plant). It is plant product that is most commonly found in coffee beans, tea, cocoa and chocolates. Caffeine is also found in some prescription and non-prescription drug including cold, allergy and pain relievers. And it is mostly used by human. In this experiment we extract the caffeine from coffee powder using organic solvent (Ethyl acetate). The effect of caffeine was studied on *Bacillus cereus*. The caffeine proved the result show as Antibacterial agent.

KEYWORDS: Micro organism, coffee.

INTRODUCTION

Caffeine(1, 3, 7-trimethylxanthine) is a bitter substance found in coffee, tea, soft drinks, chocolates and certain medicines. It has many effects on the body's metabolism including stimulating the central nervous system. This can make the human more alert and give a boost of energy. Caffeine at 150-250mg produces a sense of well being, alertness, beat boredom, allays fatigue. Action of caffeine depends upon the concentration at higher concentration of caffeine shows release of Ca^{2+} from sarcoplasmic reticulum specially in skeletal and cardiac muscle; at the therapeutic range and it shows the blockage of adenosine receptor and increase the level of cAMP.

MATERIAL AND METHODS

Coffee: The branded coffee powder was taken.

Micro-organisms: Two micro organisms were studied against coffee, *Staphylococcus aureus* and *Bacillus cereus* is an endemic, soil-dwelling,

Staphylococcus aureus is a Gram-positive coccal bacterium that is a member of the Firmicutes, and is frequently found in the human respiratory tract and on the skin. It is positive for catalase and nitrate reduction. Although *S. aureus* is not always pathogenic, it is a common cause of skin infections (e.g. boils), respiratory disease (e.g. sinusitis), and food poisoning. Disease-associated strains often promote infections by producing potent protein toxins, and expressing cell-surface proteins that bind and inactivate antibodies

Bacillus cereus is an endemic, soil-dwelling, Gram-positive, rod-shaped, motile, beta hemolytic bacterium. Some strains are harmful to humans and cause food borne illness, while other strains can be beneficial as probiotics for animals

Experimental: The caffeine was extracted from the coffee powder by using organic solvent Ethyl acetate [2] and prepared 150ml nutrient broth as control only with *Bacillus cereus* and another with caffeine. Both were incubated in B.O.D. incubator at 35°C. Same was repeated with *Staphylococcus aureus*.

Results are shown in tables 1 and comparative growth of *Bacillus cereus* is shown in figure 1.

TABLE:

OPTICAL DENSITY(O.D.)at 570nm						
sample	0 hour	4hours	11hours	15hours	26hours	30hours
1	0	0	0	0	0	0
2	0.03	0.05	0.07	0.09	0.08	0.06
3	0.61	0.65	0.58	0.58	0.57	0.57

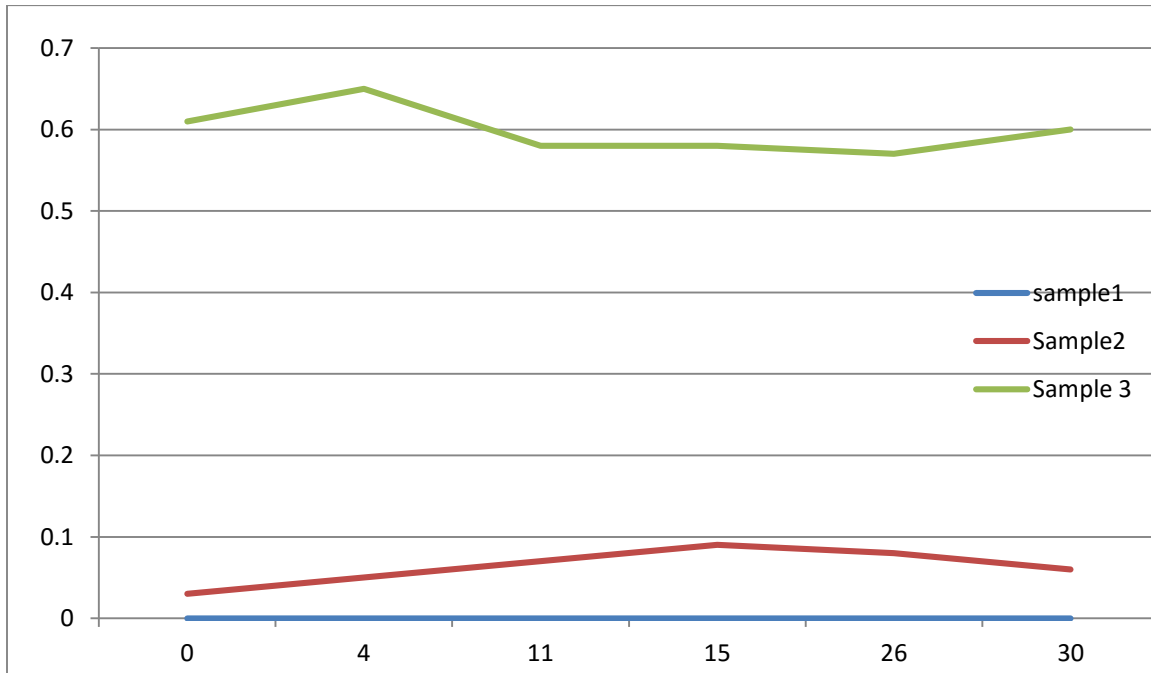


Figure: 1 show the growth curve of Bacillus cereus.

We had extracted **0.65grams Caffeine** from **150grams** Coffee powder. It was studied against *Bacillus cereus*) to see its effects on its growth.

In reference to the observation table & figure 1, control sample the initial O.D. (optical density) was **0.03 at 570nm wavelength** .O.D.was taken at different interval 4, 11,15,26,30 hours. Initial O.D. of control with *Bacillus cereus* was 0.03 and sample with *Bacillus cereus* and caffeine was 0.61.Here there was no growth in both sample. After 4hours the O.D. of control with *Bacillus cereus* was 0.05 where as O.D. of sample with caffeine and *Bacillus cereus* was 0.65. These O.D. indicates that the growth of this microorganism occurs in both samples. Then O.D. of control with *Bacillus cereus* was 0.07 after 11 hours while the O.D. of sample with caffeine was 0.58,here in control, *Bacillus cereus* has normal growth but in sample with caffeine the growth was decreasing. After 15hours the O.D. of control was 0.09 where as the O.D. of sample with caffeine was 0.58.The O.D. of control showed that the growth of *Bacillus*

Bacillus cereus was in stationary phase but the O.D. of sample with caffeine showed no growth. After 26hours, the O.D. of control was 0.08 and the O.D. of sample with caffeine was 0.57. Here the control O.D. indicates the growth of *Bacillus cereus* was in decline phase where as the sample O.D. indicates no growth of *Bacillus cereus*. After 30hours the O.D. of control with *Bacillus cereus* was 0.06 while the O.D. of sample with caffeine was 0.57. The control O.D. showed the growth of *Bacillus cereus* was in death phase but there was no growth observed in sample with caffeine. Results are shown in tables 2 and comparative growth of *Staphylococcus aureus* is shown in figure2.

OPTICAL DENSITY(O.D.)at 570nm						
sample	0 hour	4hours	11hours	15hours	26hours	30hours
1	0	0	0	0	0	0
2	0.01	0.04	0.08	0.08	0.06	0.03
3	0.73	0.78	0.69	0.60	0.60	0.60

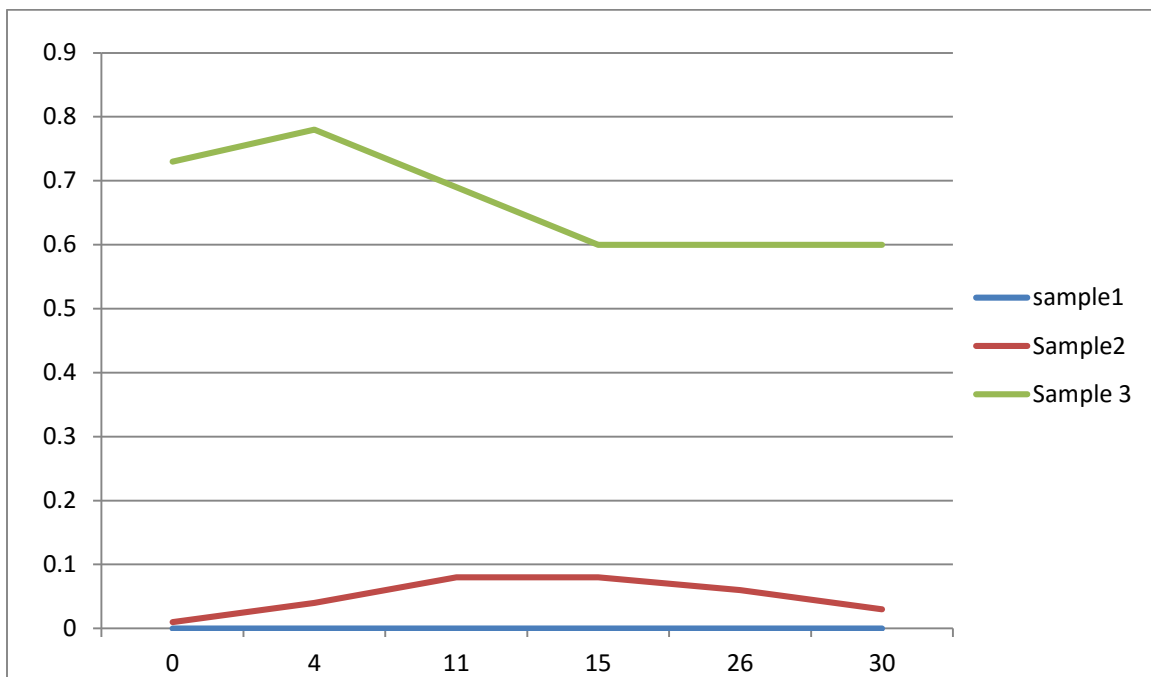


Figure:2 show the growth curve of *Staphylococcus aureus*.

We had extracted **0.65grams Caffeine** from **150grams** Coffee powder. It was studied against *Staphylococcus aureus*) to see its effects on its growth.

In microorganism *Staphylococcus aureus*, in control sample 2 the O.D. (optical density) was **0.01** at **570nm wavelength** where as the initial O.D. was taken at zero time duration. Many O.D.s were taken at a certain time interval. In graph showed the normal growth of *Staphylococcus aureus* where as in sample 3 containing caffeine the O.D. was **0.73** at **570nm wavelength** at zero hour but after **0.60** had observed.

This infers that in the presence of caffeine the growth of *Staphylococcus aureus* was inhibited.

These observations indicates that the Coffee act as an **Antimicrobial agent**.Hence drinking Coffeecan be beneficial in some cases,

REFERENCES

- [1] A preliminary study and report on caffeine degrading bacteria isolated from the soil of chittoor and Vellore, ISSN 2230.
- [2] <https://www.youtube.com/watch?v=Xzh-6ZDitQ8>