1.0 INTRODUCTION

The modern tempo of life as well as increasing number of working class require simplified food preparation time and convenience in usage as well as energy saving. Microwave oven is one of the many recent technical achievements & it has become increasingly popular in the last decade. The use of microwave ovens in industrial, commercial, domestic premises has increased substantially over recent years. In the microwave ovens, heating refers to the use of electromagnetic waves of 2450 MHz and 915 MHz frequencies to generate heat in food material. Of these two frequencies, the 2450 MHz frequency is used for home ovens, and both are used in industrial heating. Microwaves used in Radar Antenna generated enough heat & this lead to possibilities of using this heat for heating foods which led to the first patent for a microwave oven. Recent developments in microwave heating, facilitate rapid and economic method for processing of several foods.

Microwaves are very short waves of electromagnetic energy that travel at the speed of light. They are generated by a device called ‘magnetron’ which develops an alternating electrical field. The molecules within the food - especially the polar water molecules, amino acids, lipids and proteins, are forced to align themselves with the rapidly changing alternating electrical field. They oscillate around their axis in response to a reversal of the electric field that occurs up to 5 billion times per second. This oscillation creates considerable intermolecular friction that results in the generation of heat. Thus, the food is heated from the inside, due to dielectric and oscillatory ionic
properties, to outwards leaving the dishes and the oven itself cold, because microwaves do not directly heat them. In microwave heating, the food heats up while the surrounding air stays cold.

The energy absorption from microwaves can raise the temperature of the food high enough to inactivate microorganisms. Number of studies have proven that the thermal effect is the essential contributor to the destruction of microorganisms. The thermal effect on microorganisms include potentially irreversible heat denaturation of bacterial enzymes, proteins, nucleic acids, metabolites and co-factors crucial to cellular function may leak through membranes damaged by heat. Another mechanism for inactivation by microwaves involves non-thermal effects such as electroporation, cell membrane rupture and magnetic field coupling. Heat injured cells of *Staphylococcus aureus* release purine, pyrimidine and ribonucleotides into the heating medium that can be read at 260 nm, indicating the leakage of cell contents due to thermal effect on cells. Microwaves also generate instantaneous thermal energy to heat sensitive subcellular components. Moreover, when cells are allowed to recover following injury, it will take longer time for the microwave treated cells to restore their 23S RNA. Microwave heating is known to cause a greater amount of cellular injury as determined by plating on trypticase soy agar plus 7% sodium chloride and extended time for enterotoxin production. Sublethal heat injury to bacteria is also known to hinder oxygen uptake during recovery. It is feared that non-uniform heating by microwaves may lead to survival of foodborne pathogens, including salmonella and *Listeria monocytogenes*, in certain locations of foods heated at selected internal locations to endpoint temperatures that would normally be lethal.
Several factors such as composition of food, nature of bacterial cell and initial numbers of bacteria affect the microwave killing of microorganisms in milk and milk products. HTST and LTLT pasteurization carried out using microwave radiation showed inactivation of *Salmonella typhimurium*, *Escherichia coli* and *Pseudomonas fluorescence*. Industrial microwave pasteurization and sterilization systems have been reported on and off for over 30 years. Early operational systems include batch processing of yogurt in cups and continuous processing of milk. For HTST pasteurization of milk using microwave, it has been calculated that 1KW of power is required to pasteurize 270 liters of milk/hour.

Production of indigenous milk products hygienically is a major problem as some of the steps are intricate and contamination at these steps are difficult to control. Exposure of milk, paneer and khoa to microwave may increase the shelf life of products. With this background, the present investigation was undertaken with the following objectives:

- Isolation and characterization of the important bacterial contaminants of raw milk.
- Studying of the bactericidal effect of microwave on selected bacterial cells in different menstrum such as broth, milks and indigenous milk products.
- Assessment of the injurious effect of microwave on the bacterial cells in different menstrum such as broth, milks and indigenous milk products.
- Determination of the release of DNA and protein from bacterial cells during microwave exposure.
- Studying of the effect of storage of microwave treated milks, khoa and paneer...