

INTRODUCTION

- ? The diagnosis of histopathological specimen highly depends on the quality of preparation and staining of sample. These two procedures are regulated by distribution of dyes and fluids within the tissue, which is critical and key in tissue processing and staining.
- ? In the laboratory, turn-around time refers to the time needed for specimen receiving, processing and reporting of a request. It has been a significant issue since a number of years and now a days it become progressively more significant in present era of patient care, commitments as well as health care services.
- ? Thus, Rapid processing of histopathologic tissue has become more beneficial and preferable to meet the requirements of clinicians managing and treating critically ill patients.
- ? Therefore, fastest and least expensive technique that is the microwave assisted method has gained the recognition decades after the American Society of Clinical Pathologists reviewed microwave techniques. In 1970, the application of microwave power was first introduced by Mayers. Tissue fixation was performed successfully by a microwave generator that was used in physiotherapy¹.
- ? Microwaves were first introduced by Spencer in 1945. Microwaves work on the mechanism of generation of heat by oscillation or excitation of polar molecules. The microwaves are non ionizing radiation that forces rotation of bipolar protein molecules at 180° axis at the frequency of 2.45 billion cycles/second with corresponding wavelength of 12.2cm.^{2,3,4}
- ? Over 100 years, there has been a single major method of tissue processing in order to gain thin tissue sections for microscopic examination, called conventional tissue processing. Other newer technologies such as microwave assisted tissue processing and staining have been evaluated and still being tested.^{5,6}.

- ? Boon and Kok⁷ acknowledged the use of microwave ovens application in research laboratories and by that statement, the increased acceptance of microwave assisted tissue processing has reinforced for manufacture of microwave ovens specially for laboratory use.
- ? However, many studies (Hopwood et al⁸; Mathai et al⁹; Kango and Deshmukh¹⁰) have proved that, domestic (kitchen) microwaves can be used successfully for tissue processing.
- ? In past 30 years, microwave tissue processing has become progressively more beneficial in histological preparations when treatment of critically ill patients is dependent on the histopathology reports.^{11,12,13}
- ? Although conventional tissue processing is the maximum followed method, it is a strenuous, costly and time consuming method. In addition, it also uses toxic and harmful reagents like xylene and formalin¹⁴.
- ? After formalin fixation, there are three basic steps of tissue preparation that includes dehydration, clearing and infiltration. This allows embedding of tissue within paraffin wax. Fixation and processing by routine method include 24 hours of formalin fixation and overnight processing of tissue to prepare the tissue for embedding.
- ? Diffusion is an important component of histoprocessing allowing chemicals to penetrate faster within the tissue. It is known fact that use of heat decreases the viscosity of fluids thereby increasing diffusion of fluids that decreases the time of processing and staining from hours to minutes^{4,15}.
- ? Microwave oven produces heat from inside the substance (internal heating) and heat the object evenly which leads to considerable decrease in the steps of histoprocessing. Therefore, it reduces turnaround time which allows faster reporting¹⁶.

- ? Domestic microwave is used for the generation of heat to produce better results. Modifications of routine processing and staining techniques of biopsy specimen has been allowed by use of domestic microwave². Thus, domestic microwaves are easy to procure, cost effective and can be used for tissue processing and staining with better results.
- ? Tissue fixation by formalin and later clearing by chloroform or xylene has a higher health hazard risk as there is involvement of poisonous effects of their fumes. In contrast, alcohol is safe and commonly used in microwave tissue processing^{4,8}.
- ? Conventional tissue processing depends on the slow penetration of reagents from the outer area of tissue. Thus, it takes hours to complete the entire process. Since heat is an important factor in tissue processing and staining, when used, it should work its way till the interior of the specimen by heat transfer. These specimen sections should get exposure of microwave power that affects the whole specimen instantly and uniformly which facilitates the exchange of reagents and increasing the rate of reagent distribution within and outside the cells.
- ? Therefore, microwaves heat the things evenly and speedily without using convectional heat (transferring heat from one location to another through the movement of fluid inside the automatic chamber). As the microwaves are a form of non-ionizing radiation which generates alternative electromagnetic radiation that produces alternating electromagnetic field energy resulting in production of heat simultaneously. Therefore, microwaves facilitate the sooner cooking of organic materials¹⁰.
- ? For more than 100 years, conventional methods have remained the best method as automated equipment is used; however, the method is slower and costly. The process is complex, laborious and time-consuming and also includes the use of harmful carcinogenic reagents when inhaled, like xylene and formalin. From a number of years, the turnaround time has also been a subject of concern. It has become progressively more significant in this

era of patient care as well as commitment for total decreasing expenses of healthcare service.

Thus, efforts should be directed at decreasing the time of specimen processing when immediate diagnosis and commencement of emergency treatment depends on the diagnosis of histopathology examination findings.

- ? The purpose of present study is to determine the benefits of a microwave assisted accelerated method for tissue processing and staining. The protocol established and the results obtained in the laboratory by microwave method were compared with the routine method.