MICROWAVE OVEN IN MICROBIOLOGY LABORATORY

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ABSTRACT

Microwave oven can safely be used in microbiology laboratory for preparation of media. The method is convenient, reliable, economical and reproducible. It saves time and the quality of media is superior as compared to media prepared by conventional autoclaving method (JPMA 42: 2, 1992).

INTRODUCTION

Microwave energy is high frequency radiowave of 2450 MHz. These waves have the ability to viberate water molecules at extremely high speet4 producing friction resulting in heat which is generated from within, causing expansion of molecules including bacteria and viruses which are disrupted and sterilization is achieved[1]. Microwave oven, previously used for domestic purposes, is now being used in microbiology laboratory for sterilization and thawing previously prepared media. It increases the enzymatic activity of bacterial suspension forming the basis for a rapid method of microbial identification[2]. The objective of this study was to establish whether microwave oven can replace the autoclave in a microbiology laboratory. Culture media were prepared by both methods and checked for sterility, time and energy consumed, type of growth and any change in the nutritional value of media.

MATERIALS AND METHODS

Microwave oven: A domestic type of microwave oven (National - Model number N 6208) operating at 2450 MHz and with a power of 700 watt and variable power setting was used for sterilization of media. Blood agar base and MacConkey agar were used throughout the study. Both media were prepared according to manufacturers instruction. Two sets of media were prepared; one was sterilized by autoclaving at 15 lb (121°C) for 15 minutes and plates were poured and used as controls, the second set was sterilized in the microwave oven by exposing the media to microwaves at high set ting (full power) for 5 minutes. Plates were poured exactly in the same way as the conventional method and were allowed to solidify, stored in the fudge at 4°C and used when required. Six species (50 strains) of bacteria comprising of E.coli, aeromonas spp, K. pneumoniae, pseudomonas spp, kiebsiella spp, S. aureus were used in the study. The strains were subcultured onto nutrient agar to obtain 18 to 24 hour growth. Ten colonies of each strain were emulsified in 5 ml broth, 0.5 ml of each dilution was transferred to 4.5 ml sterile saline, 20 ul of each dilution was inoculated onto two sets of blood and MacConkey agar plates, one prepared in the autoclave and the other in microwave oven. Plates were incubated for 24 and 48 hours at 37°C and bacterial growth was observed.

RESULTS

Sterility check: All poured plates were incubated prior to inoculation at 37°C for 24 hours and showed no growth. A set of plates without any inoculation was used as negative control and was incubated alongwith the inoculated plates. Fifty control plates did not show any growth indicating that microwave sterilizes the media in the same way as autoclave. The inoculated plates showed slight difference in growth pattern (Table).

TABLE. Comparison of bacterial growth on media prepared by both methods

Bacteria	Blood agar		MacConkey agar	
	MO	AC	MO	AC
E. coli (10)	+	+	++	+
Aeromonas spp (10)	+	+	++	+
K. pneumoniae (10)	+	+	++	+
Klebsiella spp (8)	+	+	++	+
Pseudomonas spp (6)	+	+	++	+
S. aureus (6)	+	+	NT	NT

MO - Microwave oven
AC - Autoclave
\+ - Showing growth of < 50 colonies per drop.
++ - Showing growth of > 50 colonies per drop.
NT - Not tested.

Media (particularly MacConkey medium) sterilized in microwave oven performed better because the growth was richer when compared to the media sterilized by autoclaving. Blood agar plates prepared in microwave were marginally better otherwise there was no significant difference.

DISCUSSION

Sterilization of media by microwave oven was compared with media sterilized in the autoclave. Two medias were used, one complete media, MacConkeys agar in which all the ingredients were added before sterilization and the other in which blood was added as enriching substance after the sterilization of basal media. Both media were found sterile on sterility check thus proving that microwave oven can substitute autoclave. In addition it was found that, on complete media, the type and quality of growth obtained was superior in terms of colony size and viability of organisms because in microwave the quality of ingredients remained intact as compared to autoclaving which uses prolonged heating. Routine use of microwave oven should be recommended as it is time saving (media prepared in microwave oven takes 5 to 10 minutes while the whole process of autoclaving takes nearly 2 hours). The energy consumption in a microwave oven is less, 700 watts/hour as compared to 2000 watts/hour in autoclave. Besides this sterilization by microwave is neat and compact, a microwave oven takes less space and can be used anywhere, especially in rural areas and the running cost is also very low.

REFERENCES

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