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Copper sensitivity of *Bacillus cereus* food isolates

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ABSTRACT

Six hundred food samples of various kinds were examined for the incidence of *Bacillus cereus*. Of these 161 samples were found to be positive for the occurrence of *Bacillus cereus.* All the isolates obtained were identified by their morphological, cultural and biochemical characterization. Sensitivity of these *Bacillus cereus* food isolates was tested against copper metal discs. 139 of these isolates were found to be sensitive to copper.

Key words: *Bacillus cereus,* Copper sensitivity.

INTRODUCTION

Owing to the frequent reports of involvement of *Bacillus cereus* in food borne illness, it has become increasingly clear that this bacteria is now a common cause of such epidemics throughout the world (3, 6, 8, 10, 13, 16, 19, 21, 22). Stains of *Bacillus cereus* have been reported to cause two types of food poisoning – diarrhoeal and emetic, involving a variety of foods including meat and meat product, rice, spices, egg, milk, dried potato and other food products (1, 5, 9, 11, 15, 18, 23). Considering the high rate of incidence of this organism in different foods and the scanty reports of prevention of *Bacillus cereus* borne food illness. It is necessary to find an effective method to inhibit the growth of *Bacillus cereus* in food. The present study was thereof undertaken to test the sensitivity of *Bacillus cereus* food isolates to copper.

MATERIAL AND METHODS

161 *Bacillus cereus* isolates obtained from various food products were used in the present study. All isolates were maintained on nutrient agar slant at 4-6^0 C. Dehydrated growth media and analytical grade chemical ingredients were obtained from Hi-media Laboratory, Mumbai. Susceptibility to copper disc by *Bacillus cereus* was tested by using the method recommended by Bauer *et al.,* (1966).

About 25ml each of sterile and molten Mueller-Hintorn (MH) agar cooled to 45-50^0 C was poured asceptically in dry, sterile petriplates and allowed to become solid. Inoculum for the study was prepared by transferring a loopful of 24 hrs nutrient agar slant culture of *Bacillus cereus* test food isolate into 5ml sterile Trypticase Soy Broth. It was incubated at 37° for 4-8 hrs until light to moderate turbidity developed due to growth. When the desired turbid culture comparable with standard Barium Chloride turbid solution was obtained, the broth was used immediately for inoculation. One tenth milliliter of test broth was spread thoroughly on the surface of Mueller-Hinton agar asceptically with a bent glass rod spreader. After 15 to 20 minutes, sterile copper sic was placed on M-H agar surface. Plates were incubated at 37^0 C for 24-36 hrs. diameter of zone of inhibition of confluently growing *Bacillus cereus* culture around the copper disc was recorded in mm.

RESULTS AND DISCUSSION

The food sources of *Bacillus cereus* isolates used in the present study and the result of their sensitivity to copper disc in shown in Table 1. Out of 161 test isolates, 139 isolates have shown the marked susceptibility to copper. The zone of inhibition of most of the *Bacillus cereus* isolates was recorded to be between 15-30 mm which shows the higher sensitivity of this bacterium towards copper. This finding is greatly significant. Several workers (4, 7, 12, 14, 20) have made the same general recommendations for the prevention of *Bacillus cereus* food poisoning. These investigators have suggested to prepare small quantities of rice as needed, to keep the prepared rice hot between 55-63^0 C, to cool the cooked rice quickly and to reheat the cooked rice thoroughly before serving. It should be noted here that reheating of cooked food before serving will not protect the consumers from heat stable toxin that were produced previously in the food during its storage. Saleem et al (1982) have shown the garlic extract to be inhibitory for *Bacillus cereus.* The findings of our study are definitely valuable. It clearly indicates the effective and practical use of cooking utensils mad of copper for inhibiting the growth of *Bacillus cereus* even during the storage hours of food. Neverthless the permissible concentration of copper needs to be determined.

Table 1: Food Sources of *Bacillus cereus* isolates and their copper sensitivity

Food Sample (Total no. tested)	*Bacillus cereus* Incidence	Copper Resistant	Copper Sensitive
Plain Cooked rice (100)	27	5	22
Uncooked rice (100)	42	8	34
Spices (120)	24	3	21
Pasteurised Milk (100)	32	3	29
Dhal (60)	12	1	11
Cooked vegetable (60)	15	ND	15
Pulses (60)	9	2	7
Total (600)	161	22	139

ND – Not Detected

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