

COLICIN PRODUCTION/RESISTANCE ASSOCIATED WITH R-PLASMIDS OF GRAM NEGATIVE BACTERIA ISOLATED FROM POULTRY IN KARACHI

FASIHUDDIN AHMED ANSARI AND HAJRA KHATOON

Department of Microbiology
University of Karachi, Karachi-75270

ABSTRACT

R-plasmids of Gram negative bacteria isolated from poultry in Karachi were studied for their properties of entice, production and resistance. Of 39 R-plasmids studied, 23 resisted colicin where as only one R-plasmid produced colicin.

INTRODUCTION

R-plasmids are extra chromosomal elements that confer resistance against one or several antibiotics (Khatoon & Mohammad, 1986).

Some R-plasmids, besides conferring antibiotic resistance on their bacterial hosts, also confer the properties of colicin resistance (Siccardi, 1966). Occasionally, the property of colicin production is also exhibited by R-plasmid bearing strains (Cuppels et al, 1978 and Novakova et al., 1969). These properties may be additionally advantageous for the survival of the host bacterium and may be used for their classification and characterization. Thirty nine R-plasmids of Gram negative bacteria isolated from poultry in Karachi were studied for their properties of colicin production and resistance. Twenty three strains were found to resist colicin where as only one of these strains produced colicin (Table 1).

MATERIALS AND METHODS

Bacterial strains:

All the R plasmids were studied for their colicin resistance in *E. coli* AB712 provided by E. Adelberg tested for colicin resistance against *P. aeruginosa* CAME 2519 (which is a producer of colicin). This strain was kindly provided by the Director of CAME Lahore. Prof. Dr. S. Riazuddin.

Media and other Chemicals:

L.B. Agar (L.B.) had the following composition: Bacto tryptone 10 gms, yeast extract 1 g, NaCl 8 gms, agar 20 gms, distilled water 1000 ml. L.B. Soft had the same composition as L.B. Agar except that agar percentage was reduced from 2.0 to 0.6.

Chloroform was from BDH Laboratories. England.

Critical production/resistance associated with R-plasmids:

General techniques were same as those described by Fredericq (1957). A strain to be tested for colicin production was stabbed in the middle of a LB plate. Following growth for 48 hours, the culture was killed by chloroform vapours and overlaid by a known colicin sensitive indicator (*E. coli* Ab712), seeded in the molten soft agar. Zone of inhibition surrounding the stabbed culture following incubation for 48 hours at 37°C indicated colicin production by the stabbed culture.

Colicin resistance of a strain was studied by stabbing a known colicinogenic strain (*P. aeruginosa* CAMB 2519) in an L.B. plate. Following the necessary incubation and chloroform treatment the plate was overlaid by soft agar containing the strain to be tested for colicin resistance. Absence of inhibition zone around the stabbed culture was attributed to colicin resistance of the overlaid culture.

RESULTS AND DISCUSSION

Table-I lists the R-plasmids of Gram negative bacteria isolated from poultry in Karachi (Ansari & Khatoon 1994) which were studied for their properties of colicin production and colicin resistance. Of 39 R-plasmids studied, 23 resisted colicin where as only one R-plasmid bearing strain produced colicin.

Colicin production by R-plasmid bearing strains may result from the co-existence of a col factor or probably by association of a col determinant with the R-plasmid. Colicin resistance of a strain is due to: (a) mutation in a chromosomal gene (b) colicin production and (c) R-plasmid borne colicin resistance (Siccardi, 1966). In the absence of (a) and (b), colicin resistance of a R-plasmid bearing strain is likely to be associated with the R- plasmid. The R-plasmids which confer colicin production or colicin resistance on their hosts, provide an additional advantage to the survival of their host bacterium. The R-plasmids of Gram negative bacteria isolated from poultry in Karachi when checked for the property of colicin production were found to be non-colicinogenic except for only one strain. However, 23 R-plasmids resisted colicin. These properties are advantageous for the survival of host bacterium and may be used as a criterion for their classification.

Table 1
Colicin production/resistance associated with R plasmids

R-plasmid	Colicin production*	Colicin resistance*
pFK-1	-ve	+ve
pFK-2	-ve	+ve
pFK-3	-ve	-ve
pFK-4	-ve	+ve
pFK-5a	-ve	-ve
pFK-5b	-ve	-ve
pFK-6	-ve	+ve
pFK-7	-ve	+ve
pFK-8a	-ve	+ve
pFK-8b	-ve	-ve
pFK-9	-ve	+ve
pFK-10a	-ve	+ve
pFK-10b	-ve	+ve
pFK-10c	-ve	-ve
pFK-11	-ve	-ve
pFK-12	-ve	-ve
pFK-13	-ve	+ve
pFK-14	-ve	-ve
pFK-15	-ve	+ve
pFK-16	-ve	+ve
pFK-17	-ve	+ve
pFK-18	-ve	+ve
pFK-19	-ve	+ve
pFK-20	-ve	+ve
pFK-21	-ve	+ve
pFK-22a	-ve	+ve
pFK-22b	+ve	+ve
pFK-22c	-ve	+ve
pFK-23	-ve	+ve
pFK-24	-ve	-ve
pFK-25	-ve	-ve
pFK-26	-ve	-ve
pFK-27	-ve	-ve
pFK-28	-ve	-ve
pFK-29	-ve	-ve
pFK-30	-ve	-ve
pFK-31	-ve	-ve
pFK-32	-ve	+ve
pFK-32b	-ve	+ve

*+ve = colicinogenic or colicin resistant

-ve = non colicinogenic or colicin sensitive

Colicin production was tested with *E. coli* Ab712 as the indicator strain Colicin resistance was tested against a colicin producer *P. aeruginosa* CAMB 2519.

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