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*

20

(67,48%) 965 1430
() 340 ,

275

183 .()

13	,Enterobacteriaceae	(66,54%)
(2,18%)	6 ,Staph.aureus	(4,73%)
(14,9%)	40 ,Str.pneumonia	(12%) 33 ,
		.Psd.aeruginosa

Relationship between Human Usage of Antibiotics and Bacterial Resistance (Lattakia as a case)

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Summary

20 antibiotics were monitored for their sales for six months, through official prescriptions in six drug stores throughout Lattakia. Percent proportions of sale for each antibiotic were reported. These statistical data were correlated with laboratory studies on screening these antibiotics on different bacterial strains that collected from different laboratories and hospitals of Lattakia. The purpose of this continuous study is to undertake an assessment of levels of antibiotic resistance by local isolated bacteria, and to determine the factors influencing the offspring of that resistance.

1430 medical prescriptions were reported, 965 of them (i.e.: 67, 48%) contained one or more antibiotic. In addition, there were 340 cases of non-official sales of some distinct antibiotics.

275 of bacterial strains were isolated from clinical specimens (mostly were as urogenital, pharyngeal, wounds, and burns infections). These strains distributed as follow: 183 (i.e.: 66, 54%), were Enterobacteriaceae strains.

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13 (i.e.: 4, 73%), were *Staphylococcus aureus* strains, 6 (i.e.: 2.18%), were non-aureus staphylococci strains, 33 (i.e.: 12%), were *Str.pneumonia* strains, and 40 strains (i.e.: 14, 9%), were *Pseud.aeruginosa* strains.

The resistance levels were high among the majority of isolated strains. The multiple resistances were common. Statistical analysis of the data was done, in order to identify the relationship between percent proportions of sales with percent values of antibiotic resistance, for each group of tested bacteria. The correlation equations ranged from weak to significant. The weakest correlation coefficient was for *Pseud.aeruginosa* and *Staph. aureus*, but the highest value of correlation coefficient was for *Enterobacteriaceae* members. The correlation was acceptable for *Str.pneumonia*, and non-aureus staphylococci. There were high levels of resistance to those antibiotics that were sold directly, among all the tested bacteria.

Key words: bacteria, antibiotic, resistance, consumption.

Introduction:

" "

Martinez and)

.(29)(Baquero 2000

(11)(Davis 1997)

()

Richard et al)

.(37)(2000

Dowell)

. (13)(et al 1998 Kunin1993,Reese and)
(4-36-24)(Bettes1996,Bartlett et al1999

Gustafson)

.(16)(and Bouen 1997

McCaig and)

.(31)(Hughes 1995

:

%25

Jones1986,Vatopoulos et al)
1998,Boon and Cattanach

%15

.(26-6-44-19) (1999,Levy 1984

(Kunin1990)

50%

.(23)

Ballow and Schentag)
1992,Richard et al 1994,Jacobson
et al1995,Quale et al1996,Zhanel

(23)(Kunin 1990)

.(46-39-17-38-3) (et al1998

50%

24

48 , 63 ,(43

Methods and :

Materials

2001

. 2002

Hektoen-Enteri agar
(HiMedia-India)

.Enteric bacilli

(Amersham

Ltd)Trypticase soy agar

5%

Strepto coccus

.pneumonia

(BBL) Baird-Parker agar

78 :

.Staphylococcus aureus

16)

24

(BBL) Blood agar

- 28

8

56

NCCLS 2000

183

13 ,Entericbacilli

6 ,Staph.aureus

Stastical :

Handling

33

40 ,Streptococcus pneumonia

.Pseudomonas aeruginosa

(1)

(r)

Correlation Coefficient

Regression Line .

$$. y = B_0 + B_1x$$

Results :

965

67.44%

1430

1430

, (%67.48)

340

AMP

, 9.23% , 90

, 83

, 275

82.91% PPT / ,8.71%
 . , 71 PPT
 - .733% -
 (14.54%) TOB 11 TOB
 ,(18.18%) TET ,(1.14%)
 - CLR SUL
 ,(1.24%) 12 -
 61.45% (CHL) 21.09% 1.86%
 ,(SXT) (OXA)
 () / 6.48%
 CIP
 : .SXT -
 : -
 PPT,AMP,AUG,OXA ,(12.74%) 123
 159.75 (2)
 .58.09%
 ,PEF,CIP: - :
 165 -
 .56.36%

			RIF:	-
	:		.55.64%	153
		-	SXT,SUL:	-
)
	183		(
77	:		.40.91%	112.5
(%32)	59	(%42)	ERY,CLR :	-
9	(%21)	38	93.5	
	:	(%5)		.34.6%
AMP :			CEF,CTX :	-
PPT (78.69%)	(87,98%)		80	
	,SXT(60.11%)			.29.09%
TOB (6.60%)			:	-
	.SUL (7.65%)		.22.91%	63
	:	-	:	-
	S.aureus		.22.18%	61
			CHL:	-
	13	9	.21.09%	58
	4	:		-
(100%)			KAN,GEN,TOB	
	,CIP PPT		.19.27%	53
VAN CLR (0%)			TET:	-
	.(7.69%)		.18.18%	50

: -
 S.aureus
 S.epidermides
 :
 - SXT (50%)
 : PPT
 PPT:AMP:SXT:PEF:CIP
 - : -
 : ,PPT(84.85%)
 PPT:CIP:SXT:PEF:CHL
 -
 PPT:SXT: . VAN(6.06%)
 - : -
 : PPT,OXA (100%)
 PPT:OXA:CIP:PEF:AMP
 -
 : 25%
 PPT:OXA:CLN:CIP:SXT ,GEN,CLR
 :
 -
) (3)
 (Multiple resistance

,Cephalexin ,SXT r =0.88
 16 ,Cephadroxil .(p<0.05)
 .TET (4.70%) -

Discussion :

.(p<0.05) r=0.63
 -

AMP,PPT,SXT

r =0.34 r=0.51
 .(p<0.05)
 ,(r=0.88)

(18) (Howard et al 2001) 340

(59.70%) 203 :

(Osterblad . Penicillin :
 (35) 2000)

66 OXA,AUG,AMP,Amoxicillin

(19.41%)

) ,Norfloxacin
 regimens (19.11%) 65 PEF,CIP

: (

 .(10) (Datta and Hughes 1983)) 40%

 GEN 0% ,(30.45%

 CIP 4%,(24.59%)

 SXT 14% ,(48.09%)

 ,(60.11%)

Markovska et al (8-41-25-15-9-30-21-12-28))

 al 2001,Dellamonica et al

 1998,Kellner and Ford-Jones

 1999,Marton et al 1991,Chiou et al

 1998,Garciadelomas et al

 1997,Lancastre et al

 1999,Syrogianopoulos 1997

 Chen et al 1999)

 (

()

 21.25 PPT

 37.6 TET

 10.6 CHL

 21.2 EYR

 9.4 CLN

 42.3 SXT

 0≈ CEF,CIP,VAN,RIF

SXT

Kellner and Ford 1999, Musher)

.(33-21)(1997

Arnold et al 1996, Lopez et)

(40-27-1)(al 1999, Stratchouski 2000

90% 70%

Kloos and)

: ,(22)(Bannerman 1999 EYR, CHL, TET

.(5)(Bogado et al 2001)

(r =0.51)

.(r=0.63)

(Filloy et al)

(2-14)1976, Bajaj et al 1999

(Goldstein 1999)

:

PPT 99% 72%
,TET 80% 49%

(Filloy et al),VAN,CEF,GEN,
(14-2)1976,Bajaj et al1999

Filloy et)

Tassios et al)

-42)(1998,Weiss and Lapointe 1995

60% 20% (45

PEF,CIP

.50%

.100% 25%

(PPT,CLN,OXA,AMP,SXT)

(72% 25%) antipseudomonals

(1)

Bouza et al)

,(20-7)(1999,Jones2001.

Conclusion:

,(r =0.34)

PEF,CTX,CLR,AUG:

(1):

صادات أخرى	عدد و (%) الوصفات الطبية المتضمنة لكل صاد حيوي										عدد الوصفات (%) الخاصة بصادات حيوية	العدد الإجمالي لوصفات العامة	الصيدلية
	CLR	GEN	SUL	RIF	TET	KAN	ERY	AUG	AMP	PPT			
8 (5.52)	1 (1.45)	6 (4.14)	2 (1.38)	4 (2.76)	4 (2.76)	7 (4.83)	9 (6.21)	17 (11.72)	16 (11.03)	12 (8.27)	145 (65.91)	220	Pharmacy 1
16 (9.14)	4 (2.28)	10 (5.71)	1 (0.57)	8 (4.57)	6 (3.43)	4 (2.28)	7 (4.1)	15 (8.57)	16 (9.14)	13 (7.43)	175 (67.31)	260	Pharmacy 2
18 (9.33)	2 (1.04)	10 (5.18)	4 (2.10)	6 (3.11)	5 (2.60)	6 (3.11)	10 (93.11)	14 (7.25)	20 (10.36)	14 (7.25)	193 (68.20)	283	Pharmacy 3
32 (21.62)	1 (0.67)	6 (4.05)	3 (2.03)	3 (2.03)	3 (2.03)	5 (3.38)	6 (4.05)	12 (8.11)	12 (8.11)	9 (6.08)	148 (69.16)	214	Pharmacy 4
29 (20.86)	3 (2.16)	6 (4.32)	1 (1.39)	3 (2.16)	1 (1.39)	3 (2.16)	5 (3.60)	13 (9.35)	8 (5.75)	9 (6.47)	139 (66.51)	209	Pharmacy 5
20 (12.12)	1 (1.65)	5 (3.03)	1 (1.65)	5 (3.03)	4 (2.42)	4 (2.42)	12 (7.27)	12 (7.27)	18 (10.91)	14 (8.48)	165 (67.62)	244	Pharmacy 6
20.5 (13.1)	2 (1.54)	7.17 (4.4)	2 (1.52)	4.83 (2.94)	3.83 (2.44)	4.83 (3.03)	8.17 (5.05)	13.83 (8.71)	15 (9.22)	11.83 (7.33)	160.83 (67.44)	238.33	التوسط
123	12	43	12	29	23	29	49	83	90	71	965	1430	المجموع

(1):

صادات أخرى	عدد و (%) الوصفات الطبية المتضمنة لكل صاد حيوي										عدد الوصفات (%) الخاصة بصادات حيوية	العدد الإجمالي لوصفات العامة	الصيدلية
	CIP	PEF	CTX	CEF	SXT	OXA	TOB	VAN	CLN	CHL			
8 (5.52)	12 (98.27)	8 (5.52)	10 (6.90)	4 (2.76)	13 (8.96)	1 (1.45)	1 (1.45)	5 (3.45)	2 (1.38)	3 (2.10)	145 (65.91)	220	Pharmacy 1
16 (9.14)	11 (6.28)	14 (8)	9 (5.14)	6 (3.43)	10 (5.71)	4 (2.28)	2 (1.14)	7 (4)	6 (3.43)	6 (3.43)	175 (67.31)	260	Pharmacy 2
18 (9.33)	12 (6.22)	14 (7.25)	14 (7.25)	8 (4.14)	10 (5.18)	6 (3.11)	4 (2.10)	6 (3.11)	4 (2.10)	6 (3.11)	193 (68.20)	283	Pharmacy 3
32 (21.62)	12 (8.11)	9 (6.08)	9 (6.08)	4 (2.70)	9 (6.08)	3 (2.03)	2 (1.35)	4 (2.70)	1 (0.67)	3 (2.03)	148 (69.16)	214	Pharmacy 4
29 (20.86)	9 (6.47)	8 (5.75)	8 (5.75)	5 (3.60)	10 (7.19)	3 (2.16)	1 (1.39)	6 (4.32)	3 (2.16)	5 (3.60)	139 (66.51)	209	Pharmacy 5
20 (12.12)	10 (6.06)	10 (6.06)	10 (6.06)	5 (3.03)	14 (8.48)	1 (1.65)	1 (1.65)	4 (2.42)	7 (4.24)	7 (4.24)	165 (67.62)	244	Pharmacy 6
20.5 (13.1)	11 (6.90)	10.5 (6.78)	10 (6.20)	5.33 (3.28)	11 (6.93)	3 (2.11)	1.83 (1.51)	5.33 (3.33)	3.83 (2.40)	5 (3.08)	160.83 (67.44)	238.33	التوسط
123	66	63	20	32	66	18	11	32	23	30	965	1430	المجموع

(%) : (2)

عدد و (%) السلالات المقاومة لكل صناد حيوي										عدد العزلات	الجرثيم
CLR	GEN	NOV	RIF	TET	KAN	ERY	AUG	AMP	PPT		
9	45	13	22	17	23	77	61	161	144	183	جرثيم معوية
(4.92)	(24.59)	(7.10)	(12.02)	(9.29)	(13.66)	(42.08)	(33.33)	(87.98)	(78.69)		
0	3	4	4	6	5	5	8	8	13	13	مكورات عنقودية ذهبية
	(23.08)	(30.77)	(30.77)	(46.15)	(38.46)	(38.46)	(61.69)	(61.54)	(100)		
0	0	0	1	0	0	0	1	2	3	6	مكورات عنقودية لا ذهبية
			(16.66)				(16.76)	(33.33)	(50)		
7	6	4	6	5	7	10	7	18	28	33	مكورات رئوية
(21.21)	(18.18)	(12.12)	(18.18)	(15.15)	(21.21)	(30.30)	(21.21)	(54.54)	(84.85)		
10	10	35	30	22	18	31	28	33	40	40	زوائف زنجارية
(25)	(25)	(87.50)	(75)	(55)	(45)	(77.50)	(70)	(82.50)	(100)		
64	64	56	63	50	55	123	105	222	228	275	الاجموع
(23.27)	(23.27)	(20.36)	(22.91)	(18.18)	(20)	(44.73)	(38.18)	(80.73)	(82.91)		

(%) : (2)

عدد و (%) السلالات المقاومة لكل صناد حيوي										عدد العزلات	الجرثيم
CIP	PEF	CTX	CEF	SXT	OXA	SUL	VAN	CLN	CHL		
88	96	54	38	110	14	11	41	16	25	183	جرثيم معوية
(48.09)	(52.45)	(29.51)	(20.76)	(60.11)	(7.65)	(6.01)	(22.4)	(8.74)	(13.66)		
13	10	4	6	12	8	3	1	4	9	13	مكورات عنقودية ذهبية
(100)	(76.92)	(30.77)	(46.15)	(92.31)	(61.54)	(23.08)	(7.69)	(30.77)	(69.23)		
2	0	0	1	3	1	0	0	0	1	6	مكورات عنقودية لا ذهبية
(33.33)			(16.66)	(50)	(16.67)				(16.67)		
20	18	6	8	12	21	4	2	6	12	33	مكورات رئوية
(60.60)	(54.54)	(18.18)	(33)	(36.36)	(63.63)	(12.12)	(6.06)	(18.18)	(36.36)		
34	29	25	18	32	40	22	17	37	11	40	زوائف زنجارية
(85)	(72.50)	(62.50)	(45)	(80)	(100)	(55)	(42.5)	(92.50)	(27.50)		
157	153	89	71	169	84	40	61	63	58	275	الاجموع
(57.09)	(55.64)	(32.36)	(25.82)	(61.45)	(30.54)	(14.54)	(22.18)	(22.91)	(21.09)		

() (%) : (3)

عدد و (%) السلالات المقاومة لـ						عدد العزلات	الجراليم
أكثر من خمس صادات	حسة صادات	أربعة صادات	ثلاثة صادات	صادين	صاد واحد		
77 (42.08)	93 (50.82)	110 (60.11)	141 (77.05)	159 (86.88)	170 (92.89)	183	جراليم معوية
10 (76.92)	12 (92.31)	12 (92.31)	13 (100)	13 (100)	3 (100)	13	مكورات عنقودية ذهبية
0	0	1 (16.67)	5 (83.33)	6 (100)	6 (100)	6	مكورات عنقودية لا ذهبية
22 (66.67)	28 (84.85)	28 (84.85)	31 (93.94)	33 (100)	33 (100)	33	مكورات رئوية
36 (90)	36 (90)	40 (100)	40 (100)	40 (100)	40 (100)	40	زوائف زنجارية
145 (52.73)	169 (61.45)	191 (69.45)	230 (83.64)	251 (91.27)	252 (91.64)	275	المجموع

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