Section A -Research paper

ASSESSMENT OF THE INDICATORS FOR THE APPROPRIATE USE OF AMAs IN THE TERTIARY CARE HOSPITAL IN TRIPURA

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ABSTRACT

The microbial infections are rising resulting into more prescription of antibiotics not even as per guidelines. The appropriate use of antibiotics and fixed dose compensation are important in order to control the antibiotic resistance but due to more patients admission in the hospitals etc. the prescription of drugs is not as per guidelines. The present was carried out on the patients admitted in hospital in Tripura with an aim to find out appropriate use of the drugs for the treatment. The information was collected on the Average number of drugs per encounter is there an indication for the AMA and Average number of AMAs prescribed per encounter is the AMA effective for the disease along with dose and order of the drugs is correct or drug-drug interactions or duplication; clinically significant drug –disease interaction and appropriate use of antibiotics. The statistical analysis was carried out by employing online software and the results were significant thus identifying the indicators for inappropriate use of antibiotics as incorrect dose and drug; drug-disease interactions; drug duplication; etc. The use of cephalosporines, narrow-spectrum penicillins, meropenem, metronidazole,rifampin were significantly associated with more frequent appropriate use of AMT . The study suggests more extensive research studies in order to decrease the incidence of antibiotic resistance.

Keywords: *Antimicrobial resistance, National List of Essential Medicines (NLEM) Antimicrobial antibiotics (AMAs), Prescription as per guidelines, WHO.*

INTRODUCTION

Drug therapy plays a crucial role in improving human health by enhancing the quality of life and extending the life expectancy (Bincy Benjamin et.al., 2016). A method to evaluate and improve drug use is by conducting Drug Utilization Studies (DUS). Drug Utilization is defined by the WHO as the marketing, distribution, prescription, and use of drugs in society with special emphasis on the resulting medical, social, and economic consequences (WHO 2013). The World Medicines Situation Report of2011 concludes that inappropriate antibiotic use, including overuse and misuse, is a serious global problem. However, it does not provide insight into the appropriateness of AMT (antimicrobial therapy) and about determinants of inappropriate use. The inappropriate antibiotic use, including overuse, mode of use, under- or over-use, poor adherence and poor quality of drugs, may also contribute to the antibiotic resistance (Byarugaba D.K. et.al., 2004). However, it does not provide insight into the appropriateness of AMT and about determinants of inappropriate use.

The rationality of antibiotics is the most controversial and debated issue in today's clinical practice (Hanmant A. and Priyadarshini K et. al., 2011). Irrational antibiotics/antibacterial (ABs) usage is a global problem especially in developing countries resulting in an increased emergence of resistance to most common bacteria, higher cost of treatment, prolonged hospitalization and adverse drug reactions (Bbosa G.S. et.al., 2014). Promoting the rational use of medicines would definitely help mankind to fight the disease and the illnesses for a better tomorrow (Igbiks T. and Joseph O.F. et. al., 2017). Antimicrobials can obviously be important or even lifesaving in appropriate situations, but it is just as important to prevent unnecessary use of antimicrobials which can lead to resistance (Adiveni T. et. al., 2013). Rational use of drugs requires that patient receive medications appropriate to their clinical needs, in doses that meet their own individual requirements for an adequate period of time, at the lowest cost to them and their community (Farhan A.K.et. al., 2013). Irrational use of antibioticsshould be checked as injudicious use which can adversely affect the patient; cause emergence of antibiotic resistance and will increase the cost (Upadhyay D.K.et. al., 2008). On the basis of earlier study reports about the irrational use of antibiotics the present research work was carried out to determine the appropriateness of AMT, and to identify determinants of inappropriate use.

MATERIAL AND METHODOLOGY

The information was collected from individual prescription of patients who are admitted in medicine wards in Tripura Medical College & Dr. BRAM Teaching Hospital. The study Design was an observational study along with Study setting of Medicine inpatient department (IPD) & department of Pharmacology.

Study population: Patients admitted in Medicine department (IPD) who took antimicrobial agents (AMAs) were included in the study in order to find the appropriateness in usage. The sample size of the research is 250 and study tools for prescription of drugs and indicators were as proposed by World Health Organization (WHO) and following data was collected:

- Indication of AMA as per dosage and their effectiveness
- Dosage orders are practically correct
- Clinical significance of drug-drug and drug –disease interactions
- Accepted duration of therapy and any unnecessary duplication of drugs along with cost effectiveness

STATISTICAL ANALYSIS

The Excel sheet No.1 exhibits data collected in order to assess the appropriateness of medicines as per age and dosage. The statistical analysis was performed by using online tools to calculate the frequency, t-test, correlation and regression of various parameters in order to predict relationship and statistical significance of the data.

RESULTS AND DISCUSSION

The patient's demographic profile varies from 18 years to 85 years of age with high percentage of 40-65 years i.e. approximately 60% of patients. The frequencies distribution was calculated between the age of the patients and different parameters as per the aim of the study.

Frequency between Age and MAI Item 1(Average number of drugs per encounter) is there an indication for the AMA (A/B/C) and MAI Item 2 (Average number of AMAs prescribed per encounter) is the AMA effective for the disease (A/B/C) as shown in Table No.1

Table 1
(z for 95% CI= 1.96)

Frequency table				
Label	Value	Freq	%	Sum%
MAI	MAI	2	0.42	0.42
(A/B/C)	(A/B/C)	2	0.42	0.84
1	1	1	0.21	1.05
18	18	3	0.63	1.681
19	19	8	1.681	3.361
2	2	1	0.21	3.571
20	20	1	0.21	3.782
22	22	1	0.21	3.992
23	23	4	0.84	4.832
27	27	4	0.84	5.672
33	33	2	0.42	6.092
35	35	8	1.681	7.773
36	36	2	0.42	8.193
37	37	6	1.261	9.454
38	38	4	0.84	10.294
39	39	2	0.42	10.714
41	41	4	0.84	11.555
42	42	14	2.941	14.496
43	43	1	0.21	14.706
45	45	5	1.05	15.756
48	48	23	4.832	20.588
49	49	4	0.84	21.429
53	53	9	1.891	23.319
56	56	4	0.84	24.16
63	63	4	0.84	25
64	64	4	0.84	25.84
65	65	9	1.891	27.731
68	68	1	0.21	27.941
70	70	5	1.05	28.992
74	74	1	0.21	29.202
75	75	8	1.681	30.882

76	76	3	0.63	31.513
80	80	2	0.42	31.933
84	84	5	1.05	32.983
A	A	302	63.445	96.429
AMA	AMA	2	0.42	96.849
Age	Age	1	0.21	97.059
Is	Is	2	0.42	97.479
Item	Item	2	0.42	97.899
an	an	1	0.21	98.109
disease	disease	1	0.21	98.319
effective	effective	1	0.21	98.529
for	for	2	0.42	98.95
indication	indication	1	0.21	99.16
the	the	3	0.63	99.79
there	there	1	0.21	100
46 categories		476 cases	100%	

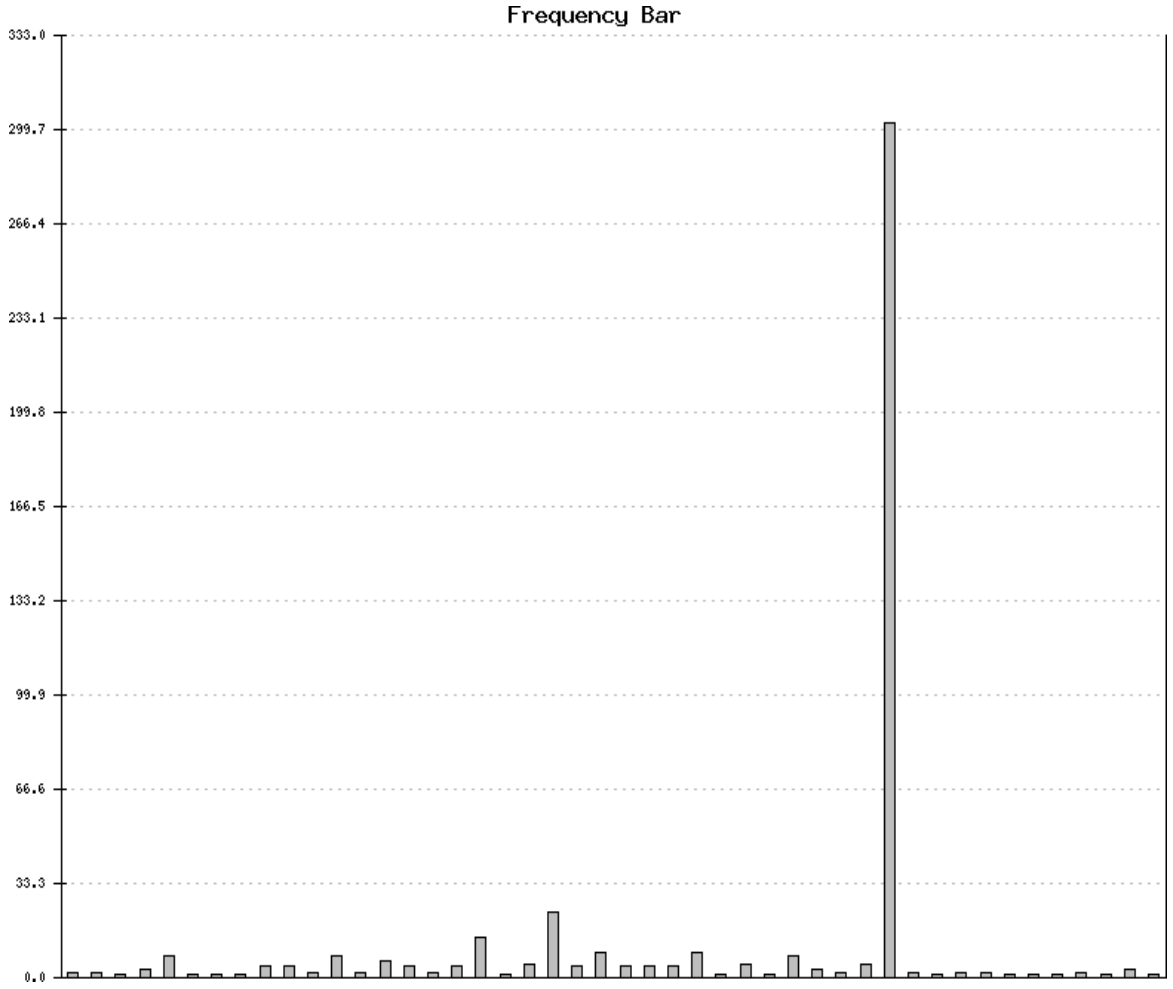

Figure 1: Bar Diagram

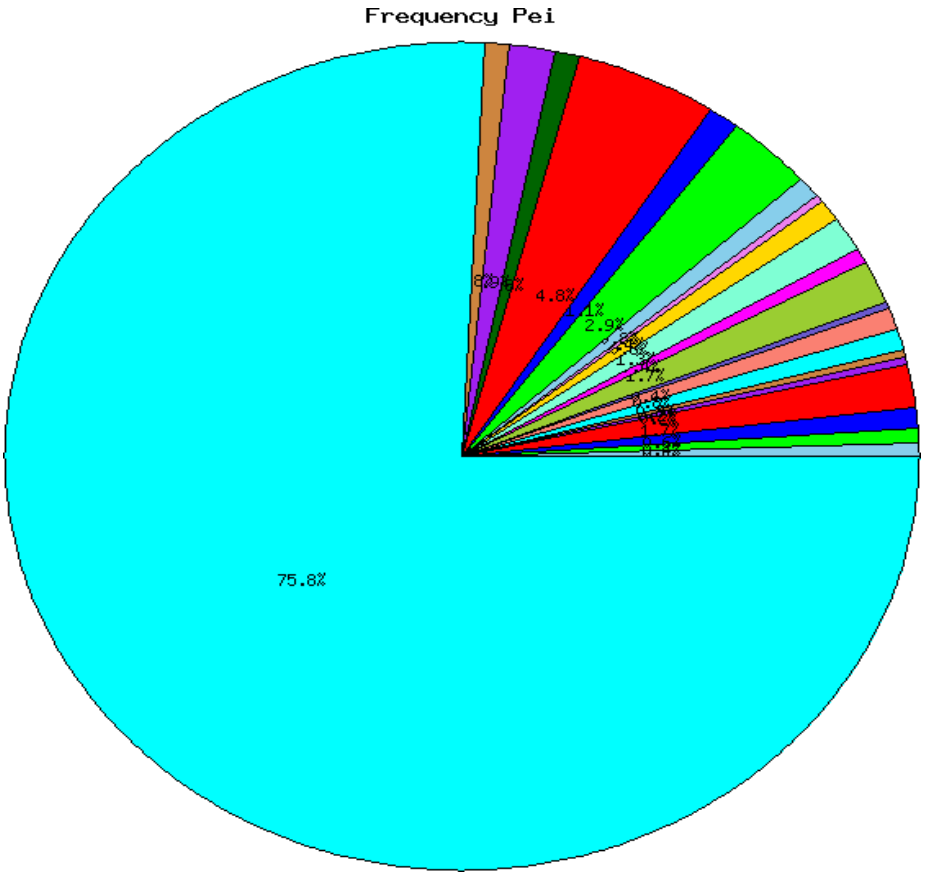

Figure 2: Pie Diagram

Table 2: Means along with the Standard Error and Deviation.

Means table										
	Label	Mean	Stddev	Variance	StdErr	95% z-C.I.	Freq	%	++%	
r1:		41	0	0	0	41	41	1	1.28	1.28
r2:	A	48.44	17.17103	294.8443	1.98274	44.55389	52.32611	75	96.15	97.44
r3:	Item	1.5	0.707107	0.5	0.5	0.520016	2.479984	2	2.56	100
All	47.14103	18.42833	339.6032	2.086597	43.05136	51.23069	78	100%	100%	

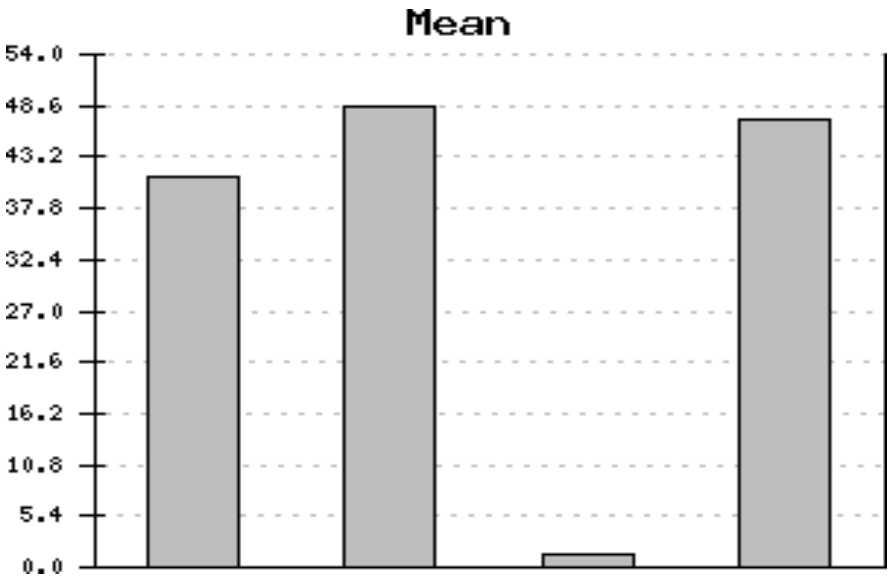

Figure 3: Bar Plot exhibiting mean

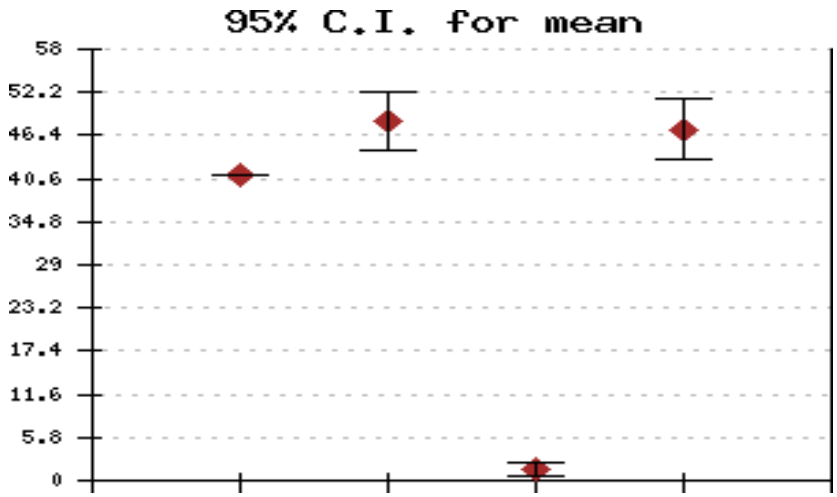

Figure 4: Scatter Plot exhibiting mean

Table 3: Frequency between age and dose and order of the drugs is correct

z for 95% CI= 1.96

Frequency table				
Label	Value	Freq	%	Sum%
MAI	MAI	2	0.426	0.426
(A/B/C)	(A/B/C)	2	0.426	0.851
18	18	3	0.638	1.489
19	19	8	1.702	3.191
20	20	1	0.213	3.404
22	22	1	0.213	3.617

23	23	4	0.851	4.468
27	27	4	0.851	5.319
3	3	1	0.213	5.532
33	33	2	0.426	5.957
35	35	8	1.702	7.66
36	36	2	0.426	8.085
37	37	6	1.277	9.362
38	38	4	0.851	10.213
39	39	2	0.426	10.638
4	4	1	0.213	10.851
41	41	4	0.851	11.702
42	42	14	2.979	14.681
43	43	1	0.213	14.894
45	45	5	1.064	15.957
48	48	23	4.894	20.851
49	49	4	0.851	21.702
53	53	9	1.915	23.617
56	56	4	0.851	24.468
63	63	4	0.851	25.319
64	64	4	0.851	26.17
65	65	9	1.915	28.085
68	68	1	0.213	28.298
70	70	5	1.064	29.362
74	74	1	0.213	29.574
75	75	8	1.702	31.277
76	76	3	0.638	31.915
80	80	2	0.426	32.34
84	84	5	1.064	33.404
A	A	290	61.702	95.106
Age	Age	1	0.213	95.319
Are	Are	1	0.213	95.532
B	B	12	2.553	98.085
Is	Is	1	0.213	98.298
Item	Item	2	0.426	98.723
correct	correct	2	0.426	99.149
dosage	dosage	1	0.213	99.362
orders	orders	1	0.213	99.574
the	the	2	0.426	100
44 categories		470 cases	100%	

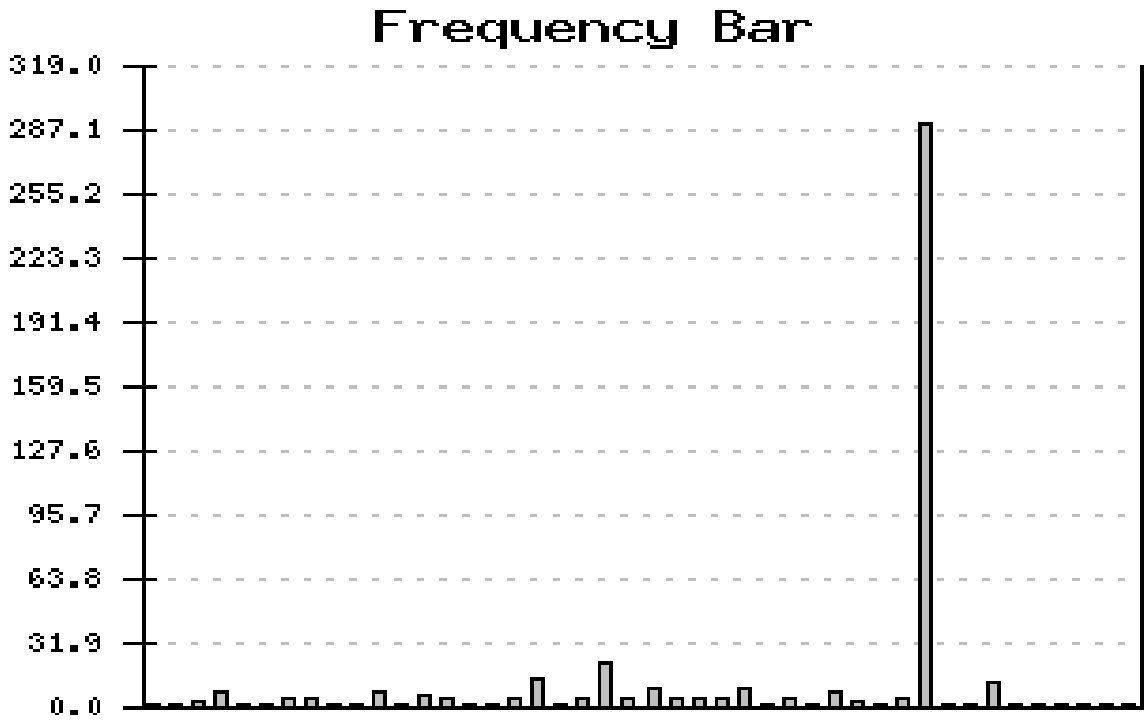

Figure 5: Bar Diagram between the age correct drug uses.

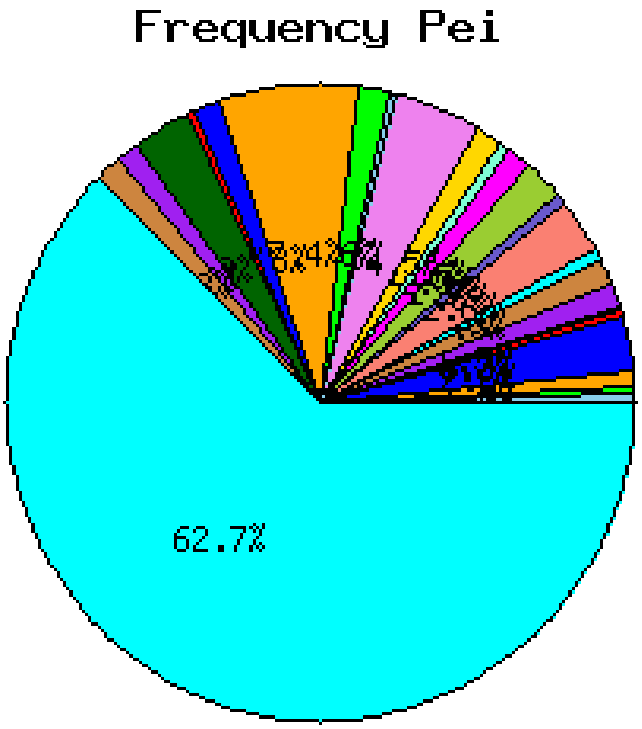

Figure 6: Pie Diagram

Table 4: Means of the Data Collected

Means table										
	Label	Mean	Stddev	Variance	StdErr	95% z-C.I.		Freq	%	++%
r1:	"	41	0	0	0	41	41	1	1.3	1.3
r2:	A	47.55072	17.28186	298.6628	2.080492	43.47303	51.62842	69	89.61	90.91
r3:	B	58.66667	12.86338	165.4667	5.251455	48.37399	68.95935	6	7.79	98.7
r4:	Item	3	0	0	0	3	3	1	1.3	100
All		47.75325	17.73426	314.5041	2.021007	43.79214	51.71435	77	100%	100%

Table 5

Skewness/Kurtosis table								
	Label	Mean	Skewness			Kurtosis		
			Sample	Population	s.e.	Sample	Population	s.e.
r1:	"	41	0	0	0	-3	0	0
r2:	A	47.55072	0.246	0.251	0.2887	-0.577	-0.52918	0.5701
r3:	B	58.66667	0.62	0.849	0.8452	-1.479	-1.81423	1.7408
r4:	Item	3	0	0	0	-3	0	0
All		47.75325	0.058	0.059	0.2739	-0.366	-0.30874	0.5415

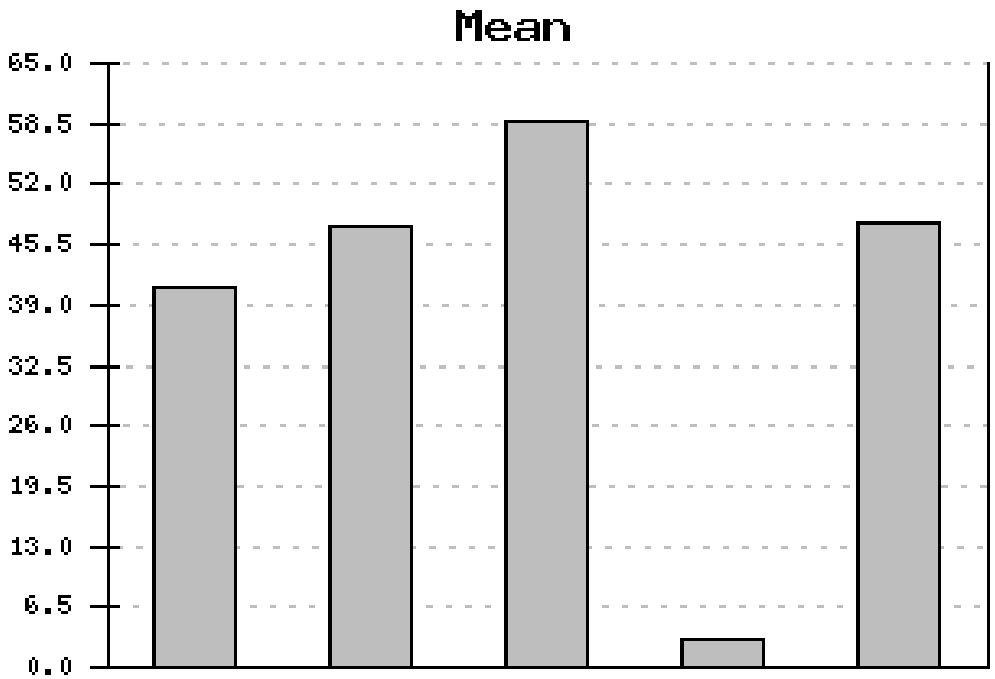

Figure 7: Bar Diagram exhibiting means.

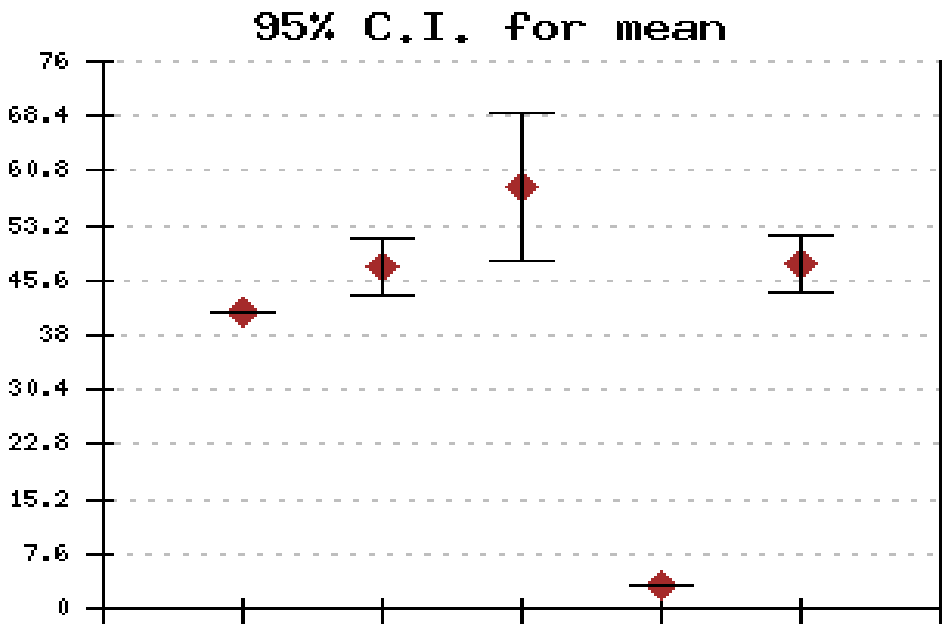

Figure 8: Scatter Plot exhibiting Means

Table 6: Frequency between the age and the drugs prescribed are correct as per order to procure

z for 95% CI= 1.96

Frequency table				
Label	Value	Freq	%	Sum%
MAI	MAI	1	0.322	0.322
(A/B/C)	(A/B/C)	1	0.322	0.643
18	18	3	0.965	1.608
19	19	8	2.572	4.18
20	20	1	0.322	4.502
22	22	1	0.322	4.823
23	23	4	1.286	6.109
27	27	4	1.286	7.395
33	33	2	0.643	8.039
35	35	8	2.572	10.611
36	36	2	0.643	11.254
37	37	6	1.929	13.183
38	38	4	1.286	14.469
39	39	2	0.643	15.113
41	41	4	1.286	16.399
42	42	14	4.502	20.9
43	43	1	0.322	21.222
45	45	5	1.608	22.83

48	48	23	7.395	30.225
49	49	4	1.286	31.511
5	5	1	0.322	31.833
53	53	9	2.894	34.727
56	56	4	1.286	36.013
63	63	4	1.286	37.299
64	64	4	1.286	38.585
65	65	9	2.894	41.479
68	68	1	0.322	41.801
70	70	5	1.608	43.408
74	74	1	0.322	43.73
75	75	8	2.572	46.302
76	76	3	0.965	47.267
80	80	2	0.643	47.91
84	84	5	1.608	49.518
A	A	34	10.932	60.45
Age	Age	1	0.322	60.772
Are	Are	1	0.322	61.093
B	B	117	37.621	98.714
Item	Item	1	0.322	99.035
orders	orders	1	0.322	99.357
practical	practical	1	0.322	99.678
the	the	1	0.322	100
41 categories		311 cases	100%	

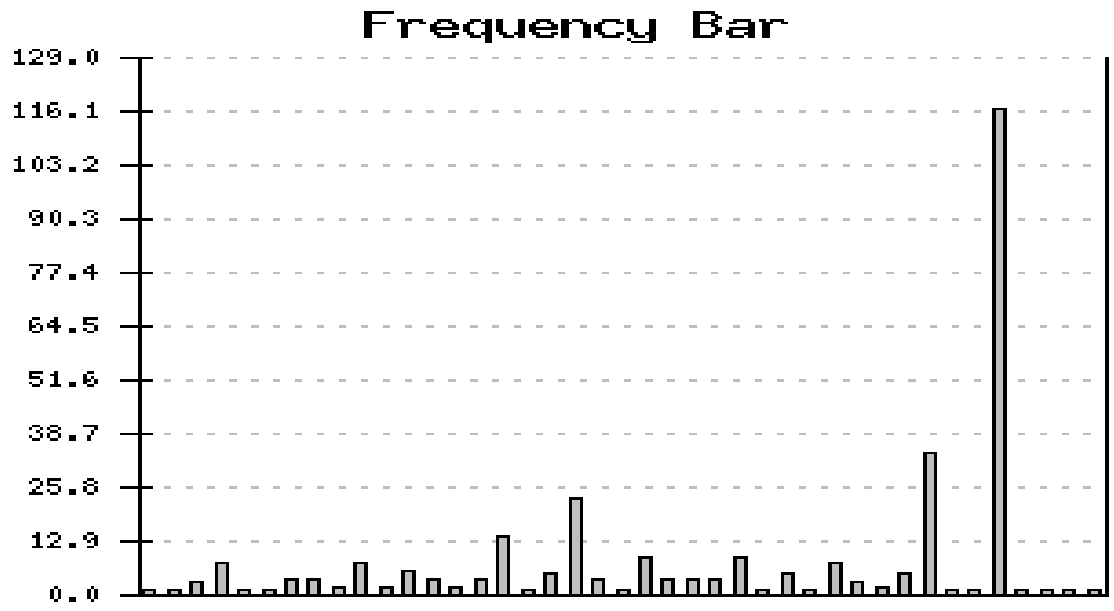

Figure 8: Bar Diagram Age and Drug Order is Correct

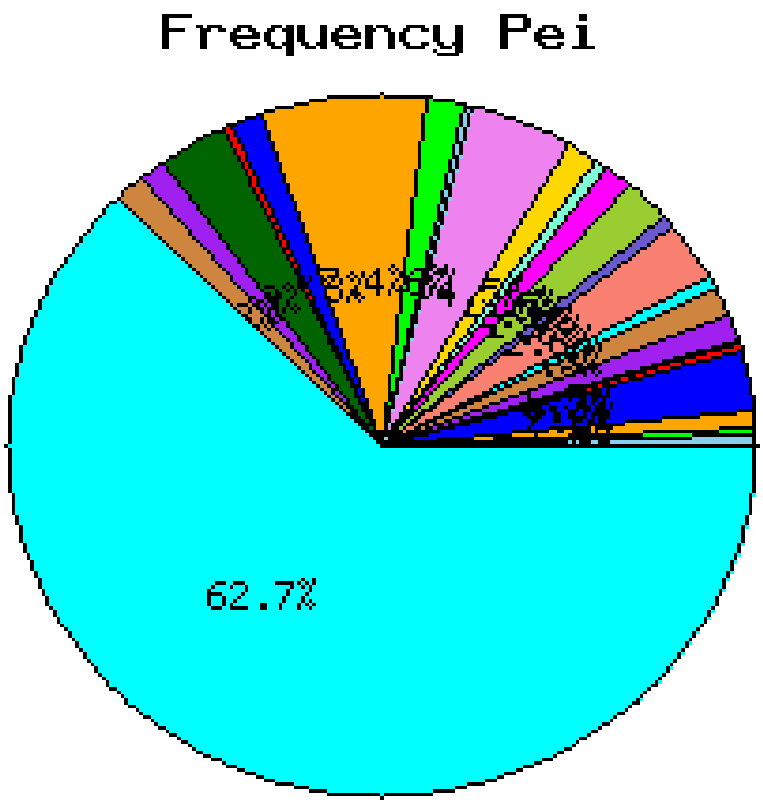

Figure 10: Pie Diagram

Table 7: Means between age and Drug prescription order

Means table										
	Label	Mean	Stddev	Variance	StdErr	95% z-C.I.		Freq	%	++%
r1:	Item	5	0	0	0	5	5	1	100	100
All		5	0	0	0	5	5	1	100%	100%

Table 8

Skewness/Kurtosis table								
	Label	Mean	Skewness			Kurtosis		
			Sample	Population	s.e.	Sample	Population	s.e.
r1:	Item	5	0	0	0	-3	0	0
All		5	0	0	0	-3	0	0

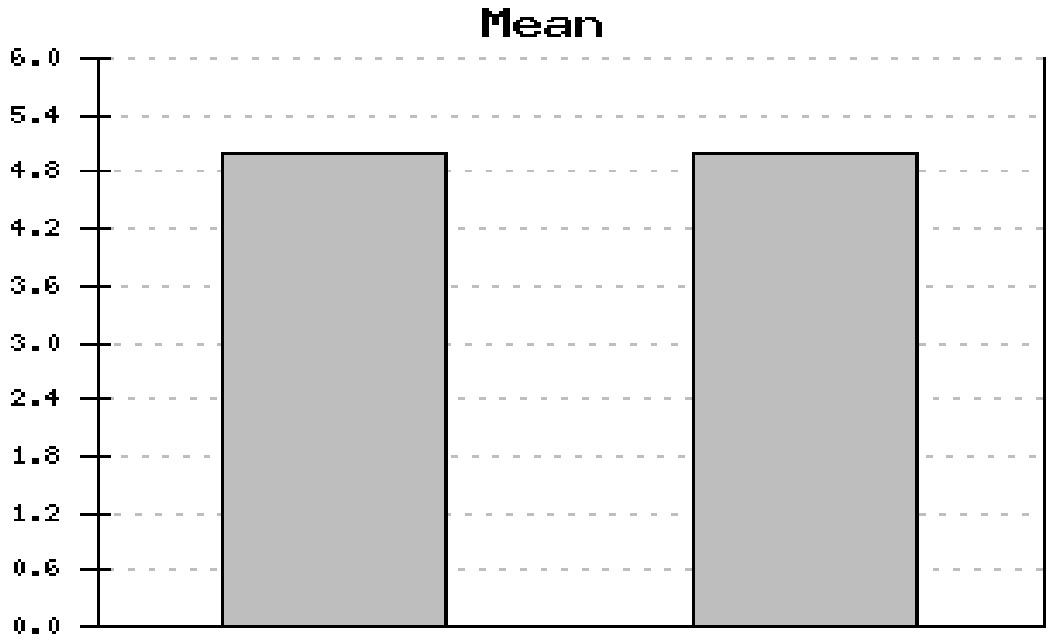

Figure 11: Means plot.

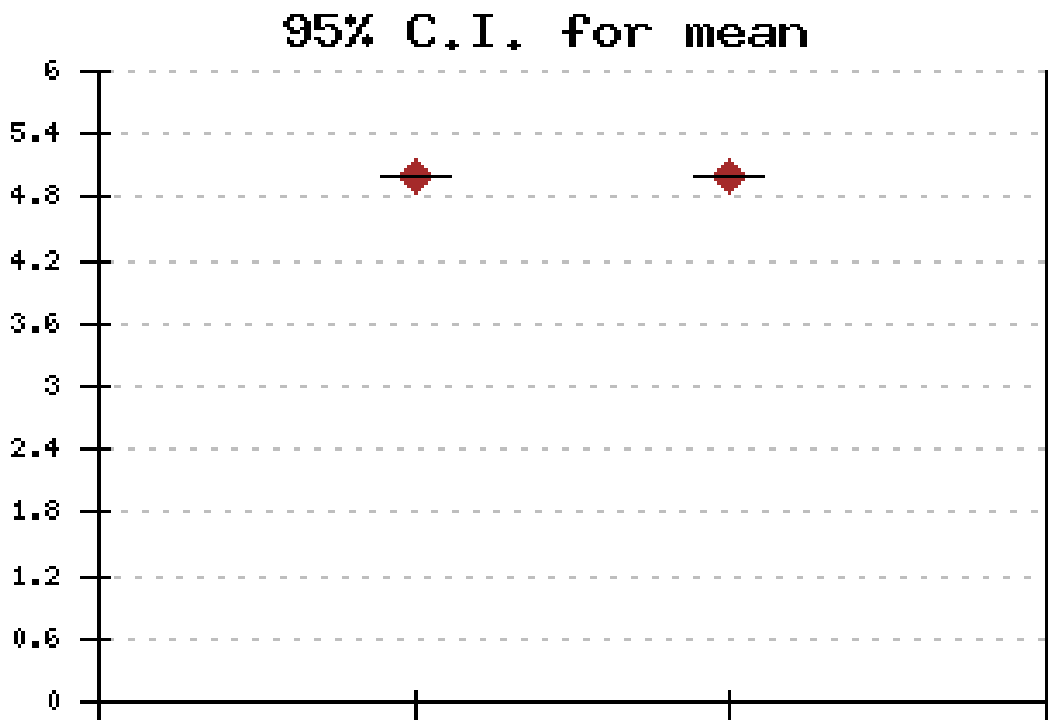

Figure 12: Scatter Plot

Table 9: Frequency between Age and drug-drug interactions

z for 95% CI= 1.96

Frequency table				
Label	Value	Freq	%	Sum%
MAI	MAI	1	0.319	0.319
(A/B/C)	(A/B/C)	1	0.319	0.639
18	18	3	0.958	1.597
19	19	8	2.556	4.153
20	20	1	0.319	4.473
22	22	1	0.319	4.792
23	23	4	1.278	6.07
27	27	4	1.278	7.348
33	33	2	0.639	7.987
35	35	8	2.556	10.543
36	36	2	0.639	11.182
37	37	6	1.917	13.099
38	38	4	1.278	14.377
39	39	2	0.639	15.016
41	41	4	1.278	16.294
42	42	14	4.473	20.767
43	43	1	0.319	21.086
45	45	5	1.597	22.684
48	48	23	7.348	30.032
49	49	4	1.278	31.31
53	53	9	2.875	34.185
56	56	4	1.278	35.463
6	6	1	0.319	35.783
63	63	4	1.278	37.061
64	64	4	1.278	38.339
65	65	9	2.875	41.214
68	68	1	0.319	41.534
70	70	5	1.597	43.131
74	74	1	0.319	43.45
75	75	8	2.556	46.006
76	76	3	0.958	46.965
80	80	2	0.639	47.604
84	84	5	1.597	49.201
A	A	151	48.243	97.444

Age	Age	1	0.319	97.764
Are	Are	1	0.319	98.083
Item	Item	1	0.319	98.403
clinically	clinically	1	0.319	98.722
drugdrug	drugdrug	1	0.319	99.042
interactions	interactions	1	0.319	99.361
significant	significant	1	0.319	99.681
there	there	1	0.319	100
42 categories		313 cases	100%	

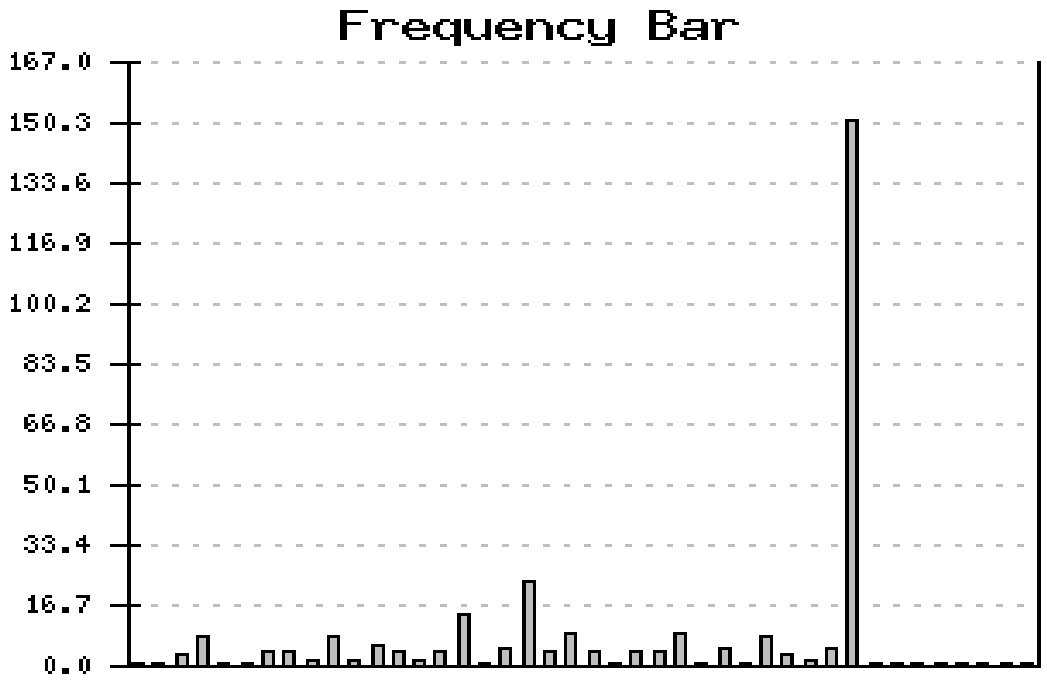

Figure 12: Bar between the Age and Drug- Drug Interactions

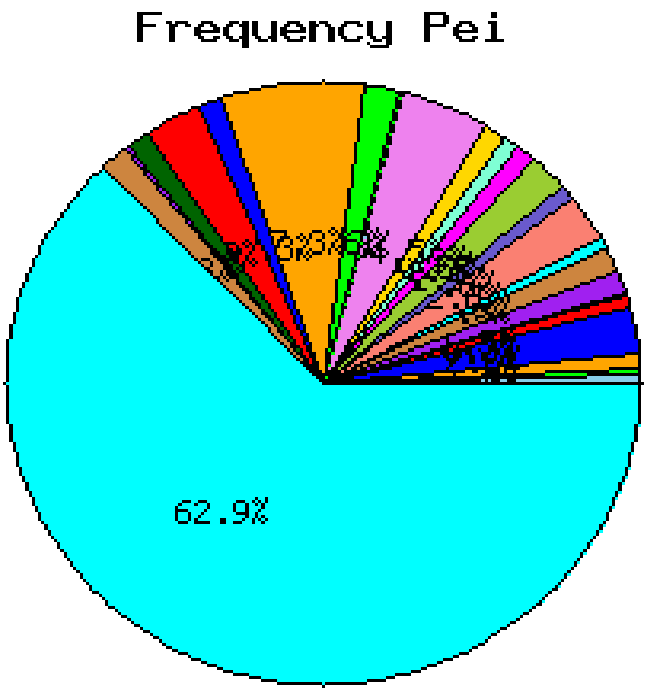

Figure 14: Pie Diagram between the Age and Drug- Drug Interactions

Table 10: Means of the values obtained

Means table										
	Label	Mean	Stddev	Variance	StdErr	95% z-C.I.		Freq	%	++%
r1:	Item	6	0	0	0	6	6	1	100	100
All		6	0	0	0	6	6	1	100%	100%

Table 11

Skewness/Kurtosis table								
	Label	Mean	Skewness			Kurtosis		
			Sample	Population	s.e.	Sample	Population	s.e.
r1:	Item	6	0	0	0	-3	0	0
All		6	0	0	0	-3	0	0

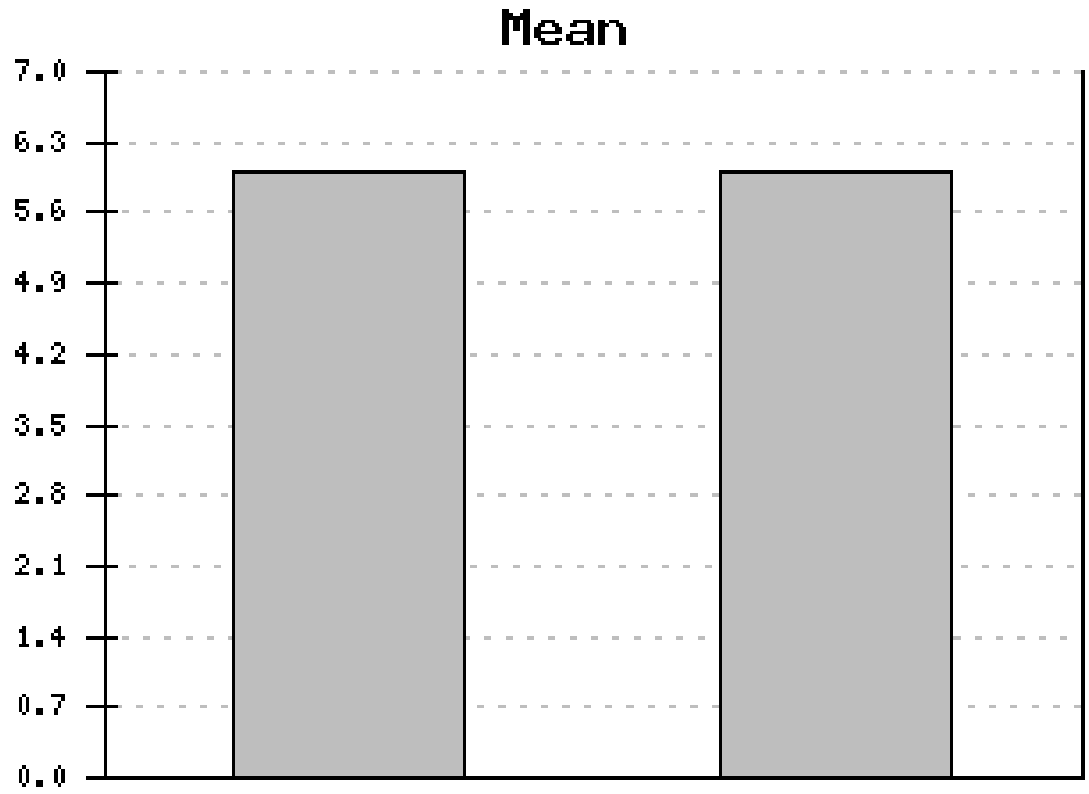

Figure 15: Bar Plot of mean.

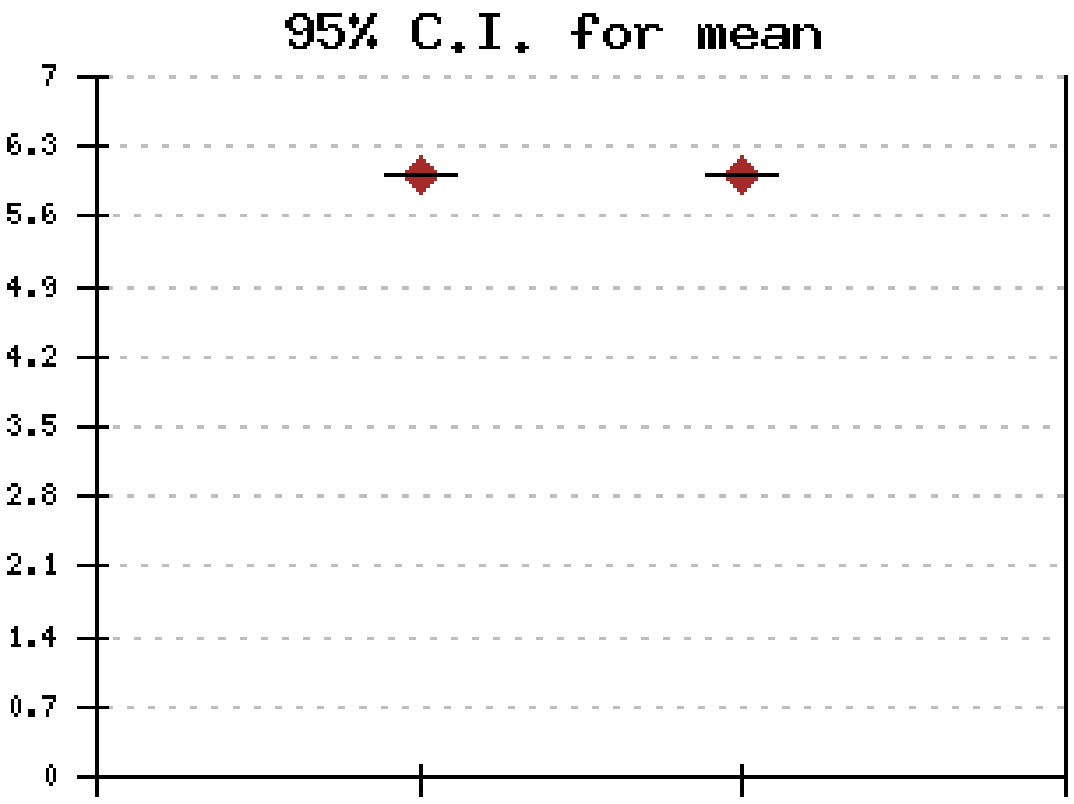

Figure 16: Scatter Plot

Table 12: Frequency between age and MAI

z for 95% CI= 1.96

Frequency table				
Label	Value	Freq	%	Sum%
MAI	MAI	1	0.318	0.318
(A/B/C)	(A/B/C)	1	0.318	0.637
18	18	3	0.955	1.592
19	19	8	2.548	4.14
20	20	1	0.318	4.459
22	22	1	0.318	4.777
23	23	4	1.274	6.051
27	27	4	1.274	7.325
33	33	2	0.637	7.962
35	35	8	2.548	10.51
36	36	2	0.637	11.146
37	37	6	1.911	13.057
38	38	4	1.274	14.331
39	39	2	0.637	14.968
41	41	4	1.274	16.242
42	42	14	4.459	20.701
43	43	1	0.318	21.019
45	45	5	1.592	22.611
48	48	23	7.325	29.936
49	49	4	1.274	31.21
53	53	9	2.866	34.076
56	56	4	1.274	35.35
63	63	4	1.274	36.624
64	64	4	1.274	37.898
65	65	9	2.866	40.764
68	68	1	0.318	41.083
70	70	5	1.592	42.675
74	74	1	0.318	42.994
75	75	8	2.548	45.541
76	76	3	0.955	46.497
8	8	1	0.318	46.815
80	80	2	0.637	47.452

84	84	5	1.592	49.045
A	A	64	20.382	69.427
Age	Age	1	0.318	69.745
B	B	59	18.79	88.535
C	C	28	8.917	97.452
Is	Is	1	0.318	97.771
Item	Item	1	0.318	98.089
drugs	drugs	1	0.318	98.408
duplication	duplication	1	0.318	98.726
other	other	1	0.318	99.045
there	there	1	0.318	99.363
unnecessary	unnecessary	1	0.318	99.682
with	with	1	0.318	100
45 categories	314 cases	100%		

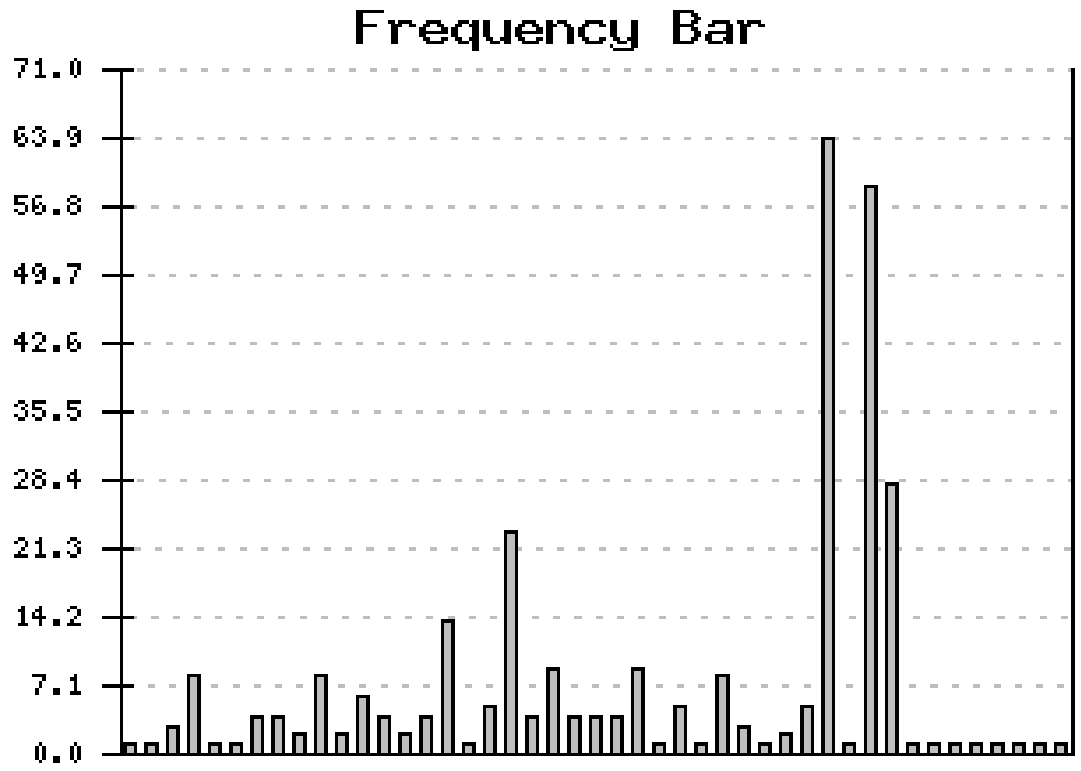

Figure 17: Bar Diagram between age and MAI Item 8 Is there unnecessary duplication with other drugs (A/B/C)

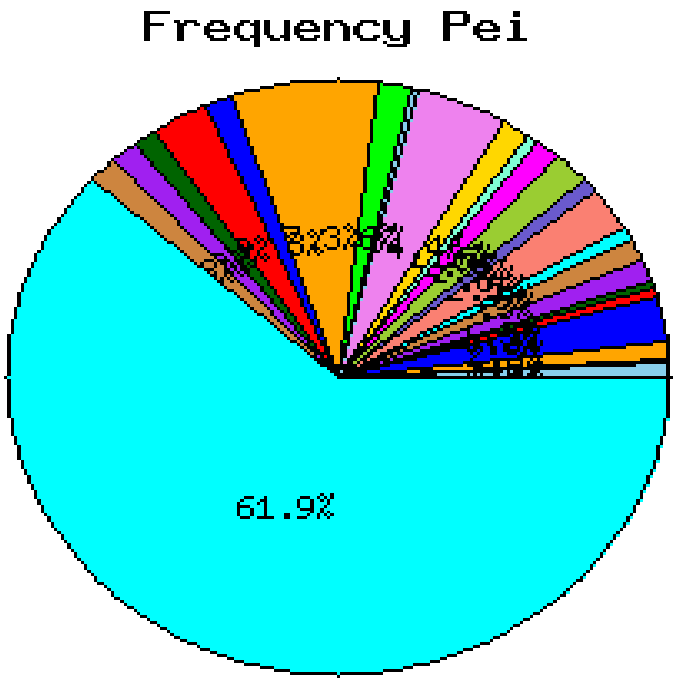

Figure 18: Pie Diagram between age and MAI Item 8 Is there unnecessary duplication with other drugs (A/B/C)

Table 13: Means Table

Means table										
	Label	Mean	Stddev	Variance	StdErr	95% z-C.I.		Freq	%	++%
r1:	"	41	0	0	0	41	41	1	0.66	0.66
r2:	A	47.42857	16.54779	273.8295	2.084826	43.34238	51.51476	63	41.45	42.11
r3:	B	51.35593	19.59923	384.1297	2.551602	46.35487	56.35699	59	38.82	80.92
r4:	C	45.46429	12.68853	160.9987	2.397906	40.76447	50.1641	28	18.42	99.34
r5:	Item	8	0	0	0	8	8	1	0.66	100
All		48.28947	17.47378	305.3329	1.41731	45.51159	51.06736	152	100%	100%

Table 14

Skewness/Kurtosis table								
	Label	Mean	Skewness			Kurtosis		
			Sample	Population	s.e.	Sample	Population	s.e.
r1:	"	41	0	0	0	-3	0	0
r2:	A	47.42857	-0.026	-0.027	0.3016	-0.744	-0.7046	0.5948
r3:	B	51.35593	-0.023	-0.024	0.3112	-0.871	-0.84098	0.6133
r4:	C	45.46429	1.31	1.386	0.4405	0.775	1.1829	0.8583
r5:	Item	8	0	0	0	-3	0	0
All		48.28947	0.141	0.142	0.1968	-0.564	-0.54266	0.3911

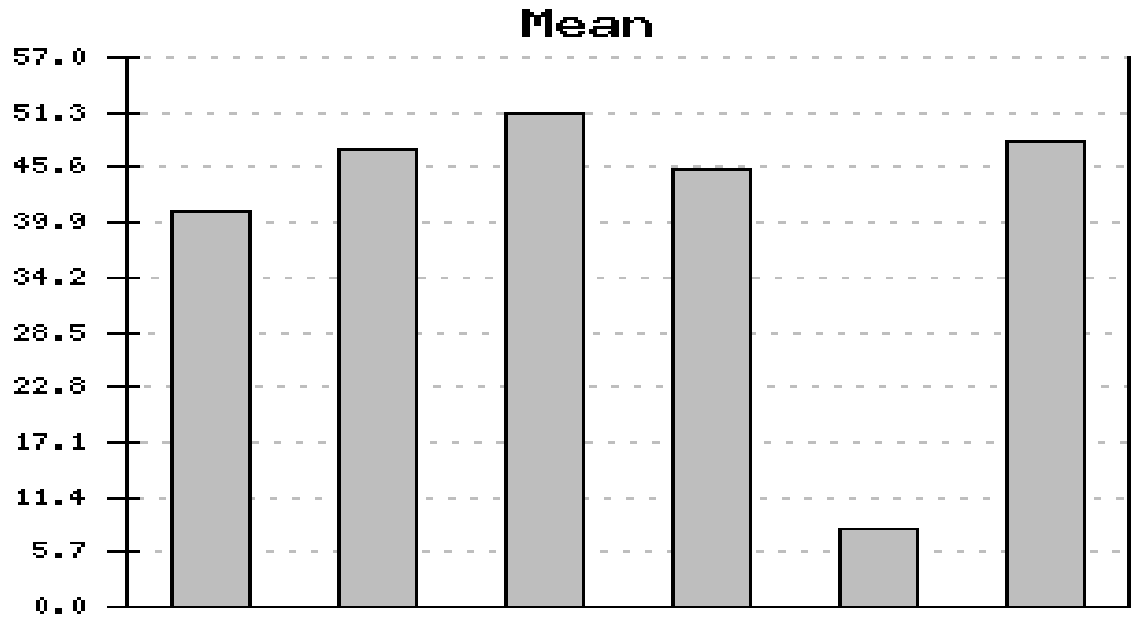

Figure 19: Means Bar Diagram.

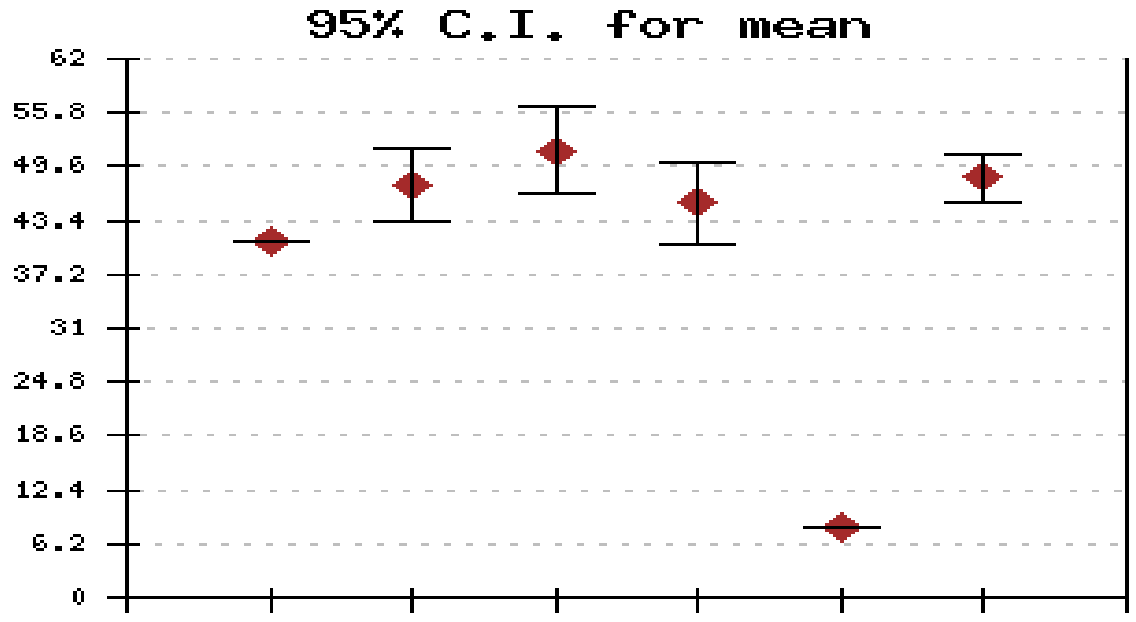

Figure 20: Scatter Plot of mean.

Table 15: Frequency between age and clinically significant drug–disease interaction.

z for 95% CI= 1.96

Frequency table				
Label	Value	Freq	%	Sum%
\"MAI	\"MAI	1	0.319	0.319
(A/B/C)\"	(A/B/C)\"	1	0.319	0.639
18	18	3	0.958	1.597
19	19	8	2.556	4.153
20	20	1	0.319	4.473
22	22	1	0.319	4.792
23	23	4	1.278	6.07
27	27	4	1.278	7.348
33	33	2	0.639	7.987
35	35	8	2.556	10.543
36	36	2	0.639	11.182
37	37	6	1.917	13.099
38	38	4	1.278	14.377
39	39	2	0.639	15.016
41	41	4	1.278	16.294
42	42	14	4.473	20.767
43	43	1	0.319	21.086
45	45	5	1.597	22.684
48	48	23	7.348	30.032
49	49	4	1.278	31.31
53	53	9	2.875	34.185
56	56	4	1.278	35.463
63	63	4	1.278	36.741
64	64	4	1.278	38.019
65	65	9	2.875	40.895
68	68	1	0.319	41.214
7	7	1	0.319	41.534
70	70	5	1.597	43.131
74	74	1	0.319	43.45
75	75	8	2.556	46.006
76	76	3	0.958	46.965
80	80	2	0.639	47.604
84	84	5	1.597	49.201
A	A	151	48.243	97.444
Age	Age	1	0.319	97.764
Are	Are	1	0.319	98.083
Item	Item	1	0.319	98.403

clinically	clinically	1	0.319	98.722
drugdisease	drugdisease	1	0.319	99.042
interactions	interactions	1	0.319	99.361
significant	significant	1	0.319	99.681
there	there	1	0.319	100
42 categories		313 cases	100%	

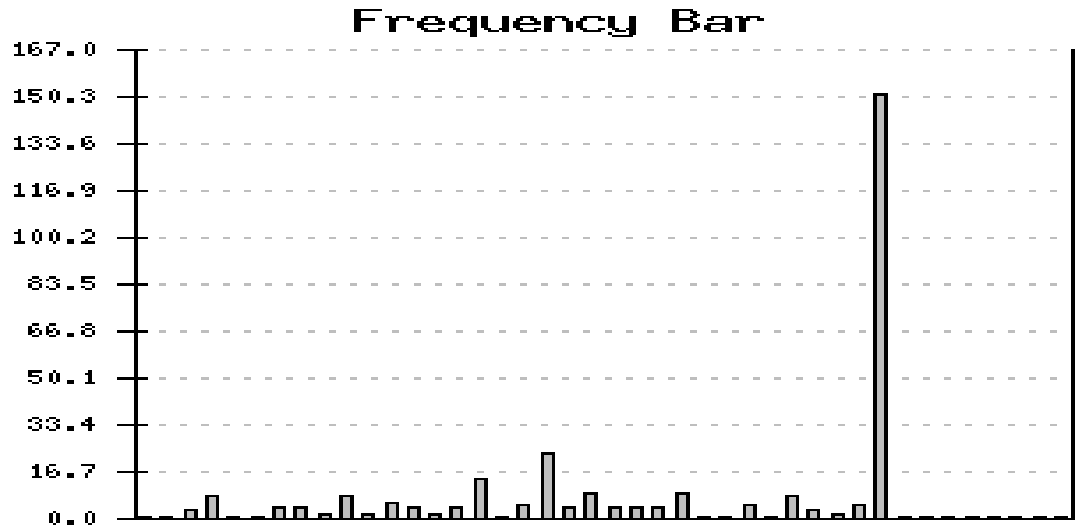

Figure 21: Bar Diagram between age and clinically significant drug-disease interaction.

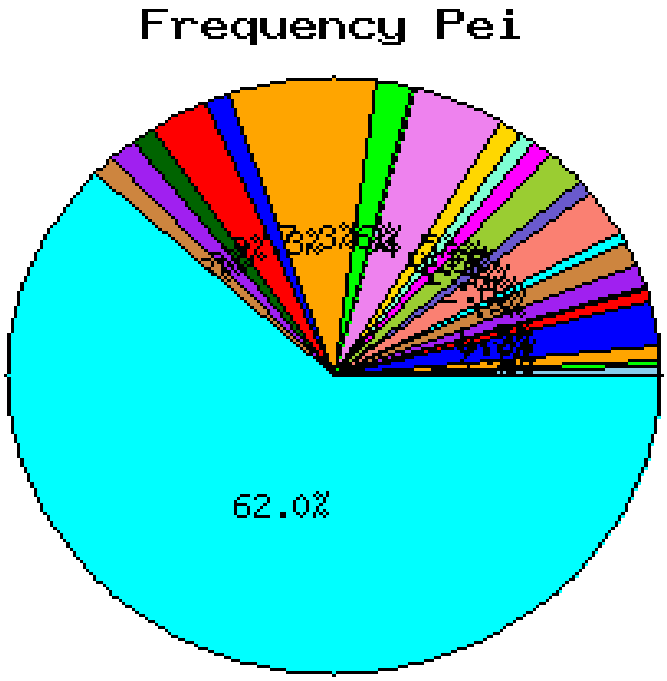

Figure 22: Pie Diagram between age and clinically significant drug-disease interaction.

Table 16: Means Table between age and clinically significant drug-disease interaction

z for 95% CI= 1.96

Means table										
	Label	Mean	Stddev	Variance	StdErr	95% z-C.I.		Freq	%	++%
r1:	Item	7	0	0	0	7	7	1	100	100
All		7	0	0	0	7	7	1	100%	100%

Table 17

Skewness/Kurtosis table								
	Label	Mean	Skewness			Kurtosis		
			Sample	Population	s.e.	Sample	Population	s.e.
r1:	Item	7	0	0	0	-3	0	0
All		7	0	0	0	-3	0	0

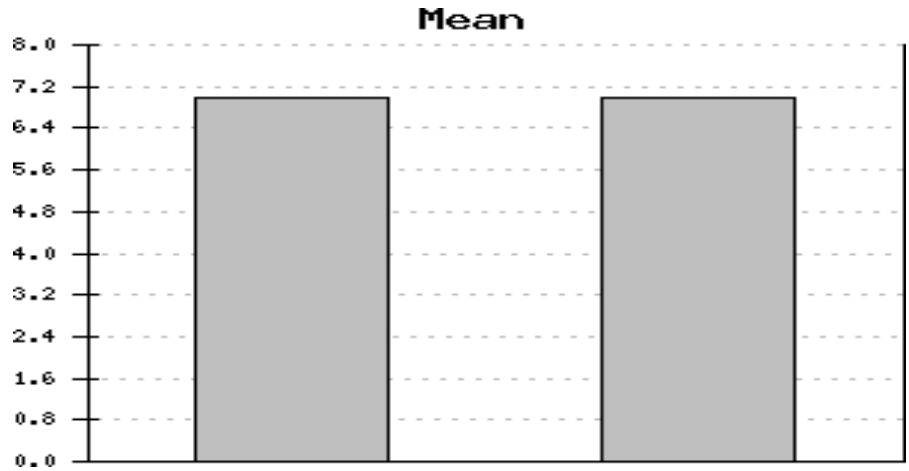

Figure 23: Bar Diagram of the Means

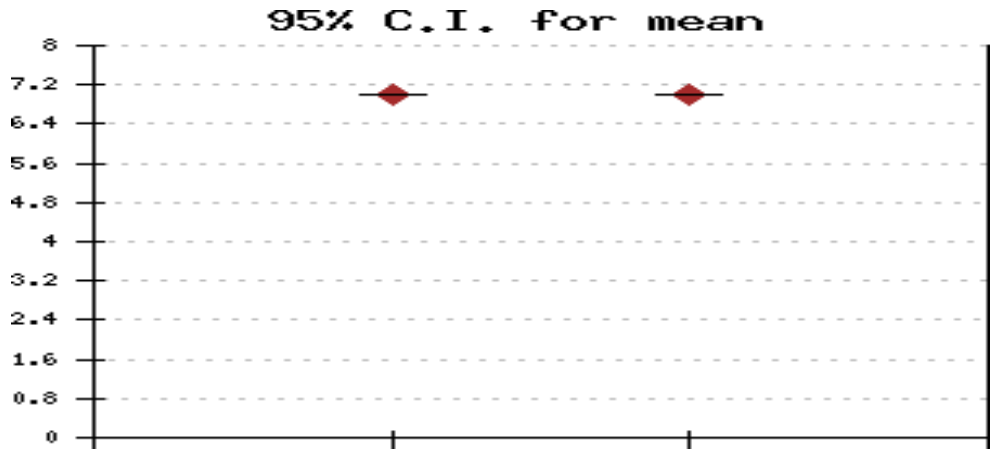

Figure 24: Scatter Plot of the Means

Table 17: Frequency between age and MAI Item 8 Is there unnecessary duplication with other drugs (A/B/C)

z for 95% CI= 1.96

Frequency table				
Label	Value	Freq	%	Sum%
\"MAI	\"MAI	1	0.318	0.318
(A/B/C)\"	(A/B/C)\"	1	0.318	0.637
18	18	3	0.955	1.592
19	19	8	2.548	4.14
20	20	1	0.318	4.459
22	22	1	0.318	4.777
23	23	4	1.274	6.051
27	27	4	1.274	7.325
33	33	2	0.637	7.962
35	35	8	2.548	10.51
36	36	2	0.637	11.146
37	37	6	1.911	13.057
38	38	4	1.274	14.331
39	39	2	0.637	14.968
41	41	4	1.274	16.242
42	42	14	4.459	20.701
43	43	1	0.318	21.019
45	45	5	1.592	22.611
48	48	23	7.325	29.936
49	49	4	1.274	31.21
53	53	9	2.866	34.076
56	56	4	1.274	35.35
63	63	4	1.274	36.624
64	64	4	1.274	37.898
65	65	9	2.866	40.764
68	68	1	0.318	41.083
70	70	5	1.592	42.675
74	74	1	0.318	42.994
75	75	8	2.548	45.541
76	76	3	0.955	46.497
8	8	1	0.318	46.815
80	80	2	0.637	47.452
84	84	5	1.592	49.045
A	A	64	20.382	69.427

Age	Age	1	0.318	69.745
B	B	59	18.79	88.535
C	C	28	8.917	97.452
Is	Is	1	0.318	97.771
Item	Item	1	0.318	98.089
drugs	drugs	1	0.318	98.408
duplication	duplication	1	0.318	98.726
other	other	1	0.318	99.045
there	there	1	0.318	99.363
unnecessary	unnecessary	1	0.318	99.682
with	with	1	0.318	100
45 categories		314 cases	100%	

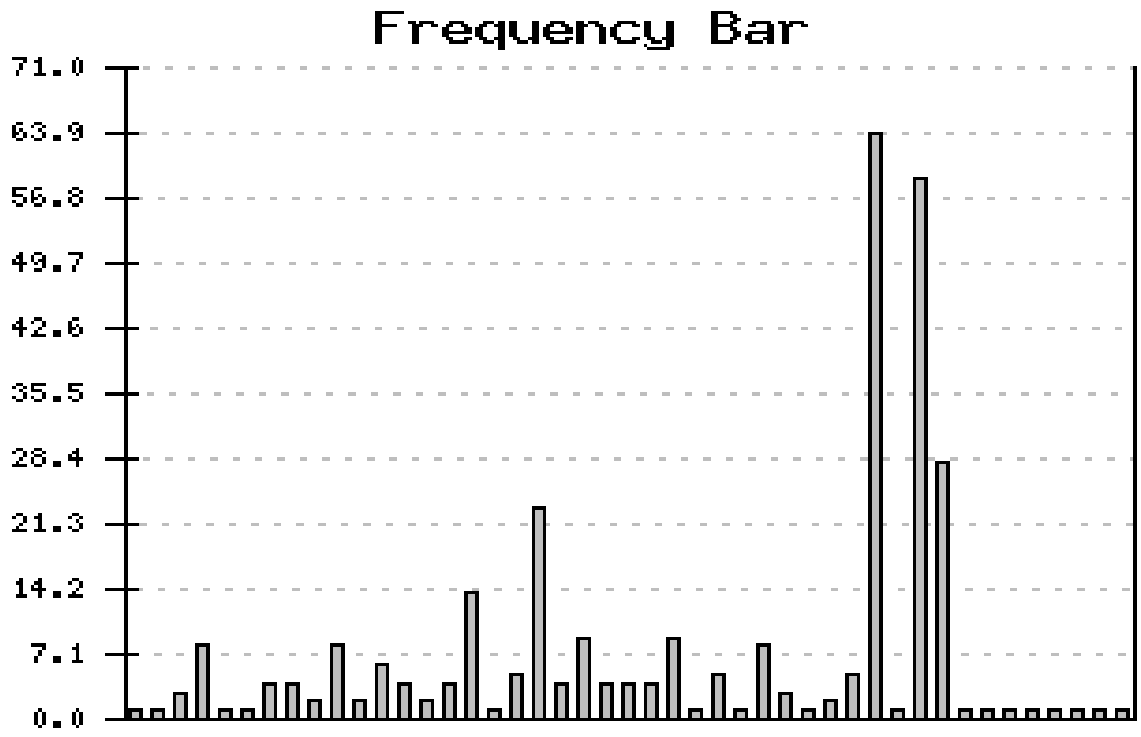

Figure 25: Bar Diagram

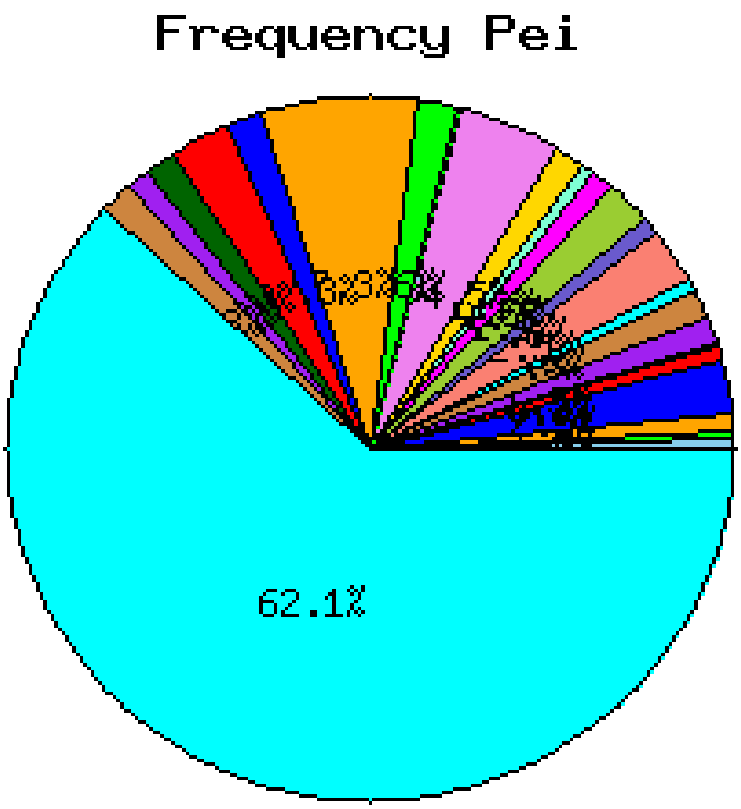

Figure 26: Pie Diagram

Table 18: Means Table between age and MAI Item 8 Is there unnecessary duplication with otherdrugs (A/B/C)

Means table										
	Label	Mean	Stddev	Variance	StdErr	95% z-C.I.		Freq	%	++%
r1:	''	41	0	0	0	41	41	1	0.66	0.66
r2:	A	47.42857	16.54779	273.8295	2.084826	43.34238	51.51476	63	41.45	42.11
r3:	B	51.35593	19.59923	384.1297	2.551602	46.35487	56.35699	59	38.82	80.92
r4:	C	45.46429	12.68853	160.9987	2.397906	40.76447	50.1641	28	18.42	99.34
r5:	Item	8	0	0	0	8	8	1	0.66	100
All		48.28947	17.47378	305.3329	1.41731	45.51159	51.06736	152	100%	100%

Table 19

Skewness/Kurtosis table								
	Label	Mean	Skewness			Kurtosis		
			Sample	Population	s.e.	Sample	Population	s.e.
r1:	''	41	0	0	0	-3	0	0
r2:	A	47.42857	-0.026	-0.027	0.3016	-0.744	-0.7046	0.5948
r3:	B	51.35593	-0.023	-0.024	0.3112	-0.871	-0.84098	0.6133

r4:	C	45.46429	1.31	1.386	0.4405	0.775	1.1829	0.8583
r5:	Item	8	0	0	0	-3	0	0
All		48.28947	0.141	0.142	0.1968	-0.564	-0.54266	0.3911

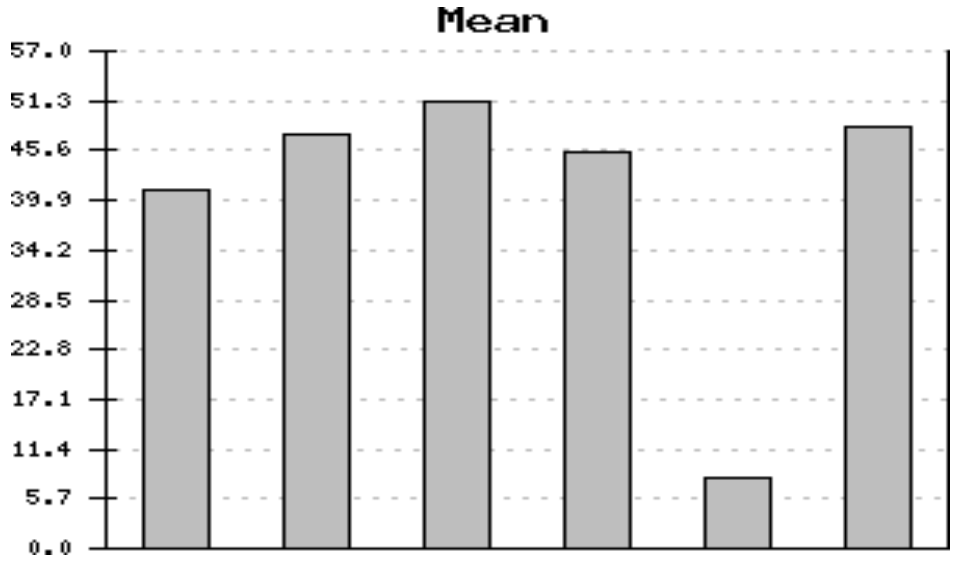

Figure 27: Bar Diagram of the Means.

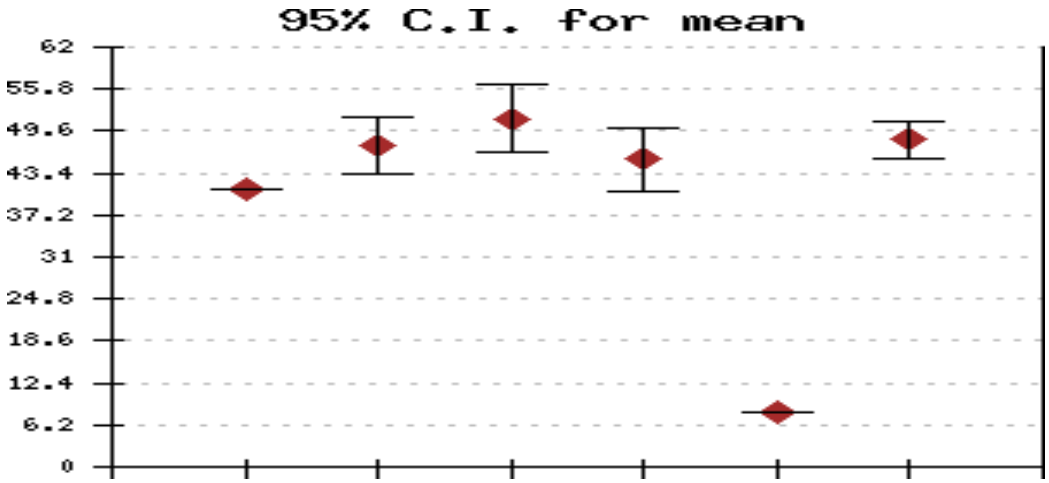

Figure 28: Bar Diagram of the Means.

Table 20: Frequency between age MAI Item 9 Is the duration of therapy acceptable (A/B/C).

Frequency table				
Label	Value	Freq	%	Sum%
		2	0.635	0.635
(A/B/C)	(A/B/C)	1	0.317	0.952
18	18	3	0.952	1.905
19	19	8	2.54	4.444

20	20	1	0.317	4.762
22	22	1	0.317	5.079
23	23	4	1.27	6.349
27	27	4	1.27	7.619
33	33	2	0.635	8.254
35	35	8	2.54	10.794
36	36	2	0.635	11.429
37	37	6	1.905	13.333
38	38	4	1.27	14.603
39	39	2	0.635	15.238
41	41	4	1.27	16.508
42	42	14	4.444	20.952
43	43	1	0.317	21.27
45	45	5	1.587	22.857
48	48	23	7.302	30.159
49	49	4	1.27	31.429
53	53	9	2.857	34.286
56	56	4	1.27	35.556
63	63	4	1.27	36.825
64	64	4	1.27	38.095
65	65	9	2.857	40.952
68	68	1	0.317	41.27
70	70	5	1.587	42.857
74	74	1	0.317	43.175
75	75	8	2.54	45.714
76	76	3	0.952	46.667
80	80	2	0.635	47.302
84	84	5	1.587	48.889
9	9	1	0.317	49.206
A	A	88	27.937	77.143
Age	Age	1	0.317	77.46
B	B	63	20	97.46
Is	Is	1	0.317	97.778
Item	Item	1	0.317	98.095
MAI	MAI	1	0.317	98.413
acceptable	acceptable	1	0.317	98.73
duration	duration	1	0.317	99.048
of	of	1	0.317	99.365
the	the	1	0.317	99.683
therapy	therapy	1	0.317	100
44 Categories		315 cases	100%	

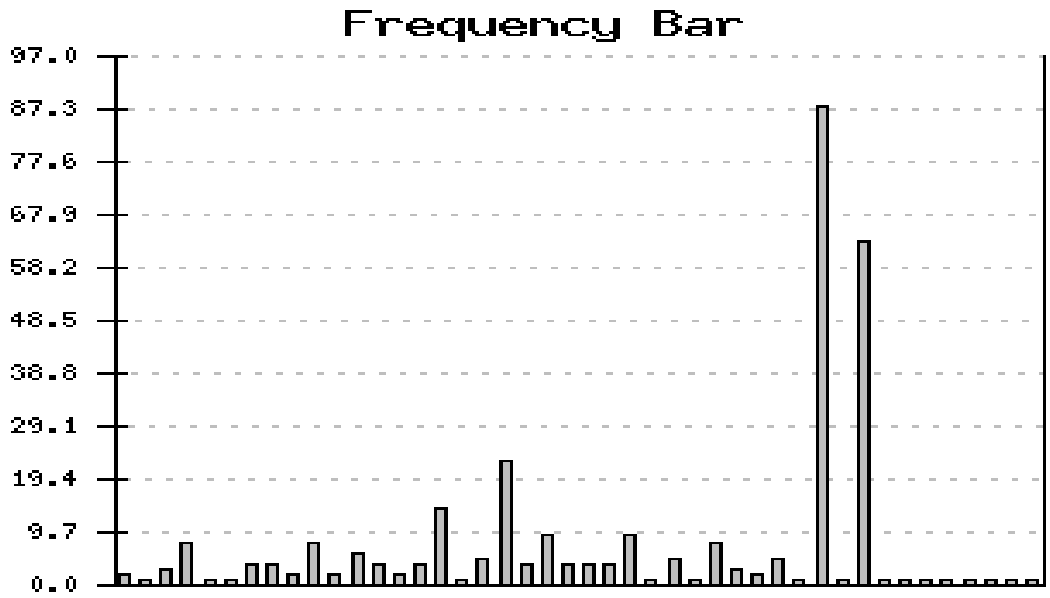

Figure 29: Bar Diagram between age and MAI Item 9 Is the duration of therapy acceptable (A/B/C)

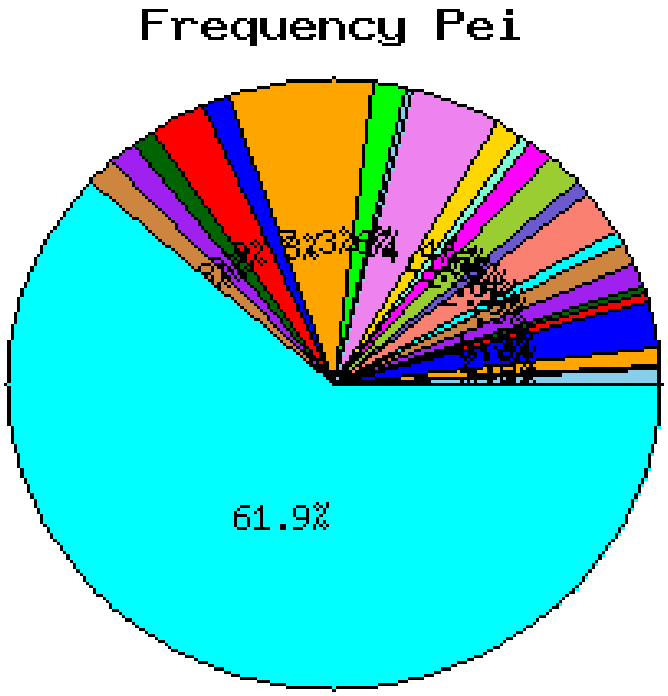

Figure 30: Pie Diagram between age and MAI Item 9 Is the duration of therapy acceptable (A/B/C)

Table 21: Means

z for 95% CI= 1.96

Means table									
	Label	Mean	Std dev	Variance	Std Err	95% z-C.I.	Freq	%	++%

r1:		41	0	0	0	41	41	1	0.66	0.66
r2:	A	48.4023	15.97415	255.1735	1.712609	45.04564	51.75896	87	57.62	58.28
r3:	B	48.88889	19.03317	362.2616	2.397954	44.18898	53.5888	63	41.72	100
All		48.55629	17.21845	296.4751	1.401218	45.80995	51.30263	151	100%	100%

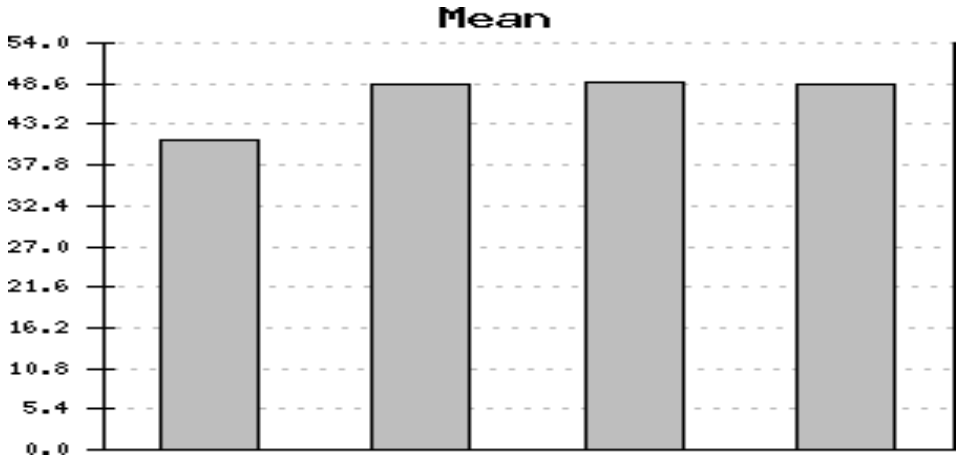

Figure 31: Bar plot diagram

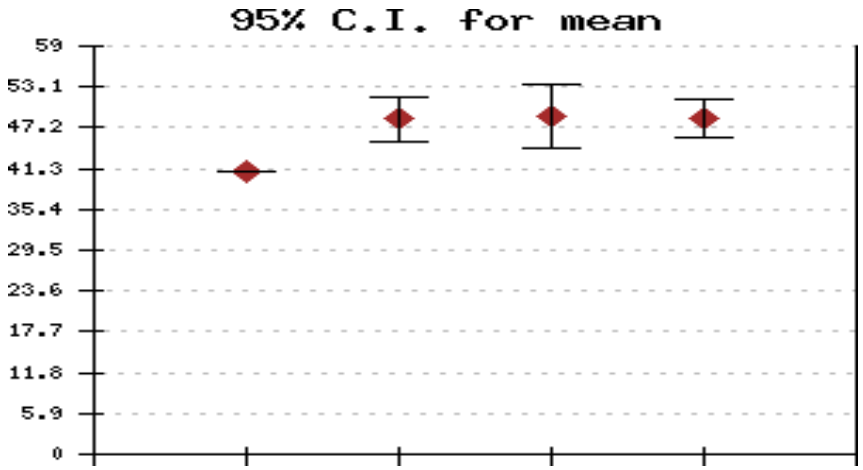

Figure 32: Scatter plot diagram.

Table 22: Frequency between age and MAI Item 10Is this AMA the least expensive alternative compared with others of equal utility (A/B/C)

z for 95% CI= 1.96

Frequency table				
Label	Value	Freq	%	Sum%
\"MAI	\"MAI	1	0.161	0.161
(A/B/C)\"	(A/B/C)\"	1	0.161	0.323
0	0	86	13.871	14.194
1	1	60	9.677	23.871

10	10	1	0.161	24.032
18	18	3	0.484	24.516
19	19	8	1.29	25.806
2	2	4	0.645	26.452
20	20	1	0.161	26.613
22	22	1	0.161	26.774
23	23	4	0.645	27.419
27	27	4	0.645	28.065
33	33	2	0.323	28.387
35	35	8	1.29	29.677
36	36	2	0.323	30
37	37	6	0.968	30.968
38	38	4	0.645	31.613
39	39	2	0.323	31.935
41	41	3	0.484	32.419
42	42	14	2.258	34.677
43	43	1	0.161	34.839
45	45	5	0.806	35.645
48	48	23	3.71	39.355
49	49	4	0.645	40
53	53	9	1.452	41.452
56	56	4	0.645	42.097
63	63	4	0.645	42.742
64	64	4	0.645	43.387
65	65	9	1.452	44.839
68	68	1	0.161	45
70	70	5	0.806	45.806
74	74	1	0.161	45.968
75	75	8	1.29	47.258
76	76	3	0.484	47.742
80	80	2	0.323	48.065
84	84	5	0.806	48.871
A	A	47	7.581	56.452
AMA	AMA	1	0.161	56.613
Age	Age	1	0.161	56.774
Appropriate	Appropriate	150	24.194	80.968
B	B	64	10.323	91.29
C	C	39	6.29	97.581
Is	Is	1	0.161	97.742
Item	Item	1	0.161	97.903
Remarks	Remarks	1	0.161	98.065
Score	Score	1	0.161	98.226

alternative	alternative	1	0.161	98.387
compared	compared	1	0.161	98.548
equal	equal	1	0.161	98.71
expensive	expensive	1	0.161	98.871
least	least	1	0.161	99.032
of	of	1	0.161	99.194
others	others	1	0.161	99.355
the	the	1	0.161	99.516
this	this	1	0.161	99.677
utility	utility	1	0.161	99.839
with	with	1	0.161	100
57 categories		620 cases	100%	

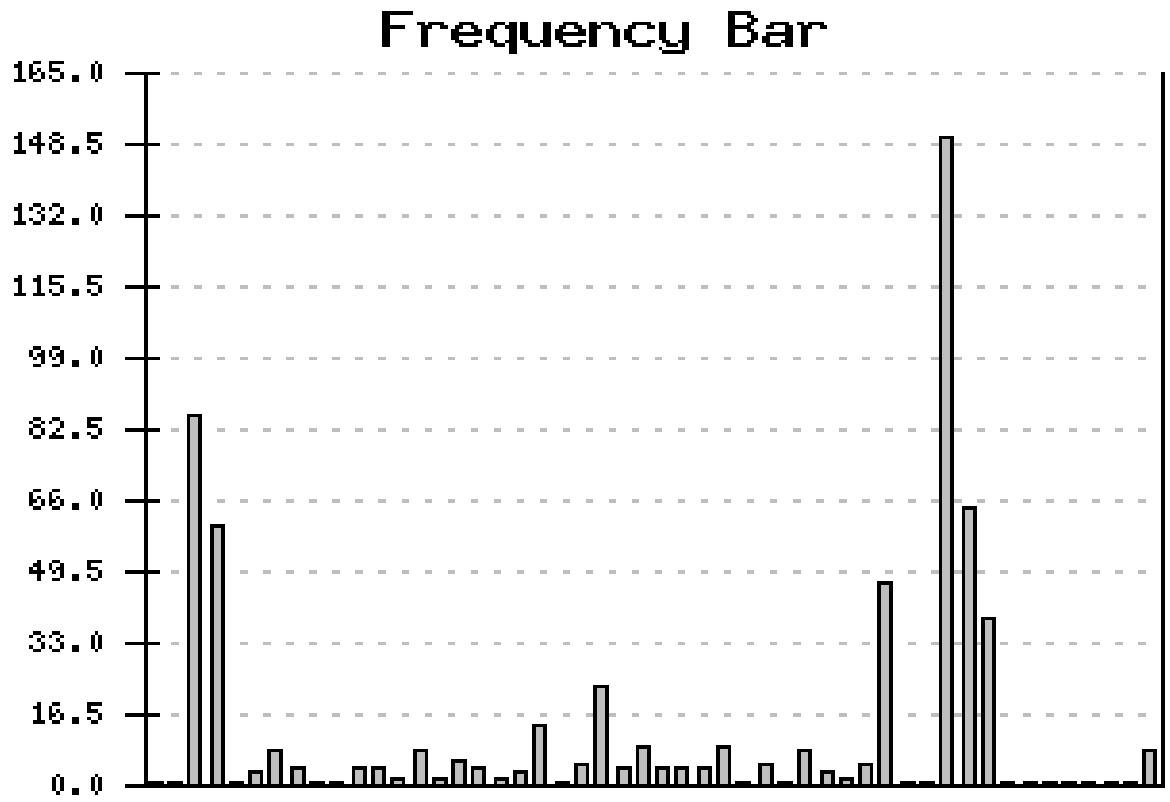

Figure 33: Bar Diagram

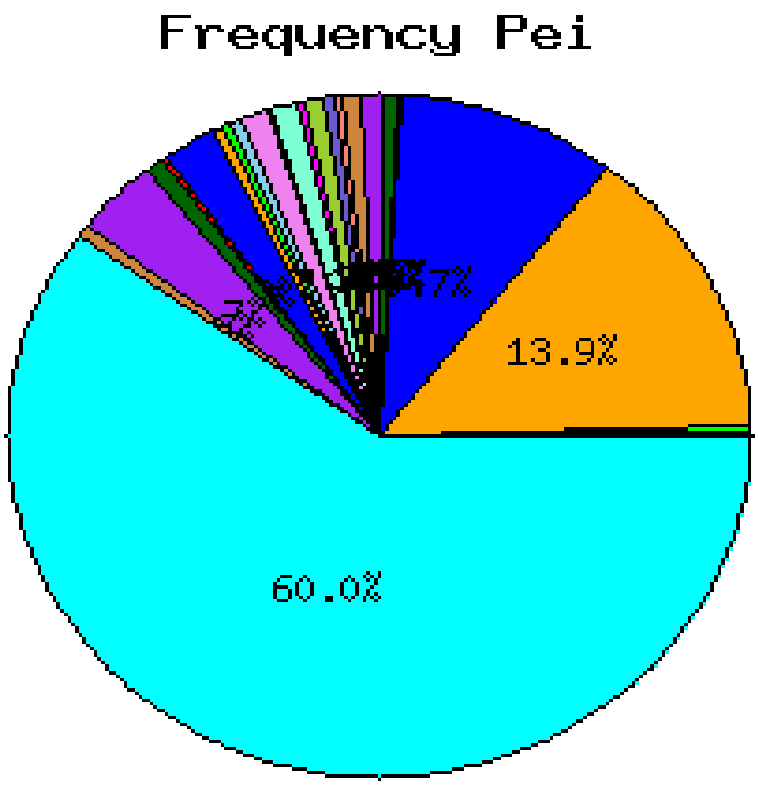

Figure 34: Pie Diagram

Table 23: Means Table

z for 95% CI= 1.96

Means table								
	Label	Mean	Stddev	Variance	StdErr	95% z-C.I.		Freq
r1:	A	0.021277	0.145865	0.021277	0.021277	-0.020425	0.062978	47
r2:	Appropriate	48.65772	17.31183	299.6996	1.418241	45.87801	51.43742	149
r3:	B	0.375	0.48795	0.238095	0.060994	0.255454	0.494546	64
r4:	C	1.102564	0.307355	0.094467	0.049216	1.006102	1.199026	39
r5:	Item	10	0	0	0	10	10	1
r6:	Remarks	41	0	0	0	41	41	1
All		24.48173	26.99229	728.5838	1.55581	21.43239	27.53106	301

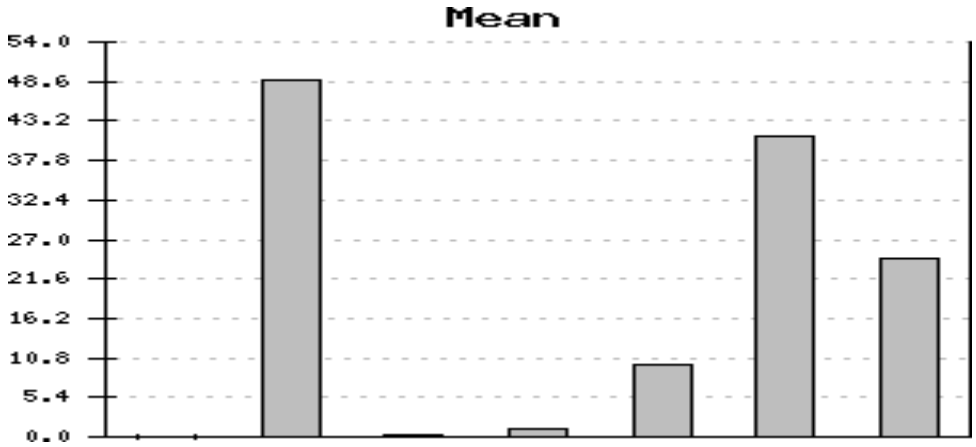

Figure 34: Bar plot

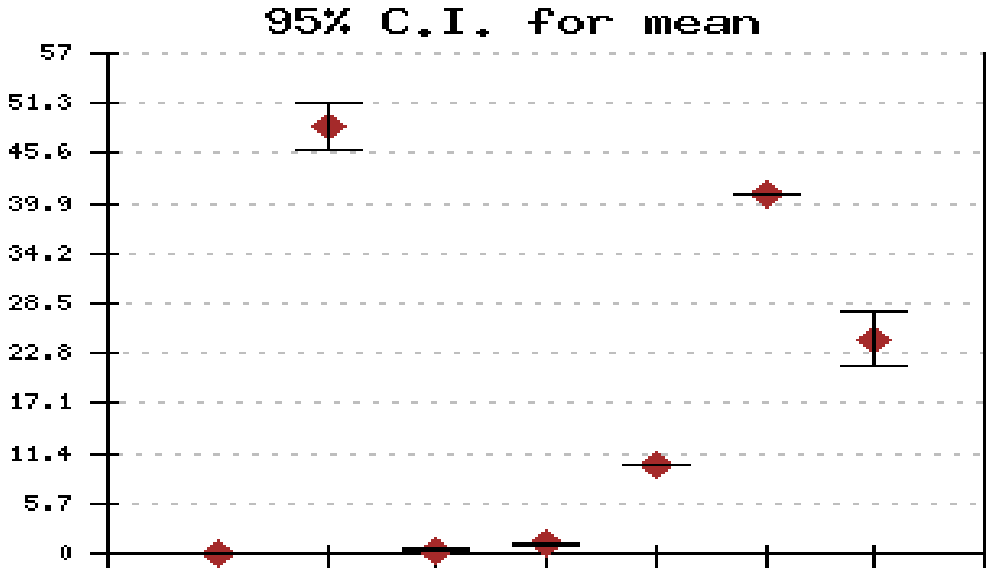

Figure 35: Scatter plot

Above statistical results predict that the AMAs are prescribed as per the guidelines but the interactions or duplication and appropriate use of the AMAs are dependent on the disease condition and patient age. The statistical results are significant and show that the appropriate prescription is important to avoid the antibiotic resistance. Determinants of inappropriate use of antibiotics in the univariate analysis, the use of quinolones and amoxicillin clavulanic acid were statistically significantly associated with more frequent inappropriate use of AMT. The use of cephalosporines, narrow- spectrum penicillins, meropenem, metronidazole, rifampin were significantly associated with more frequent appropriate use of AMT.

DISCUSSION

Studies have shown that 15% to 21% of prescriptions contain at least 1 inappropriately prescribed drug. In a recent survey, 16% of patients reported to receive inappropriate medication and two-thirds of cases were outpatients. In another study performed, 11% of Adverse Drug Events were due to inappropriate medications. Inappropriate medicines use wastes economic resources that could be used for food or other necessities. Unnecessary over use of medicines can stimulate patient noncompliance, lead to

medicine stock-outs and loss of patient confidence in the health system. In the present study dosage regimen was the fifth top problem only above therapeutic duplication, drug disease contraindication and drug-drug interaction. This could be because no complex drugs dosage regimen seen in the study set up as infectious disease was prevalent unlike the developed countries where chronic diseases are prevalent which need drugs like digoxin, theophylline and others whose dosage regimen adjustment is very complicated.

Laurence Senn et. al conducted a randomized, controlled, open trial for 5 months to improve the appropriateness of antibiotic therapy through reassessment and they suggest that a short questionnaire, addressed to the physician in charge of an inpatient treated with intravenous antibiotics for 3–4 days, has the potential to foster reassessment of this therapy and speed up its adjustment.

Bincy Benjamin et. al planned a prospective, observational study to explore and describe the current pattern of antimicrobial prescribing practices and utilization in critically ill patients. Their study revealed that appropriate use of AMAs and culture sensitivity pattern in ICUs is highly beneficial for the proper functioning of the hospital. Bayew Tsega and Eyasu Makonnen had done a study on comparative evaluation of drug prescription appropriateness in public and private health institutions of south west Ethiopia using Ethiopian standard treatment guideline for health centres, American Hospital Formulary Systems (AHFS), American paediatrics association guideline, infectious diseases guidelines and the drug interaction software Thompson MICROMEDEX as basis for comparison In their study they had shown that inappropriate prescription is being practiced both in private and public health facilities in the study area which might give a clue for prescription practice in the country. This needs immediate attention to correct the malpractice.

As per the earlier studies our study also depicts inappropriate and drug duplication for the treatments in the practice usually in older patients thus some more guidelines should be framed in order to avoid the overuse of the AMAs. Inappropriate medicines use wastes economic resources that could be used for food or other necessities. Unnecessary over use of medicines can stimulate inappropriate patient noncompliance and lead to medicine stock-outs and loss of patient confidence in the health system.

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