

Radiation dose from panoramic imaging at different dentistry clinics in Tripoli region

R.AL.Ben Salama¹,M.Amer¹

Libyan Academy, Biomedical Engineering Department, Tripoli- Libya¹

r.bensalama_std@academy.edu.ly

الجرعة الإشعاع من التصوير البانورامي في عيادات طب الأسنان المختلفة في منطقة طرابلس

ر. بن سلامة¹، م. عامر

الأكاديمية الليبية- قسم الهندسة الطبية الحيوية طرابلس- ليبيا¹

الملخص

تم إجراء دراسة تصوير بانورامية أولية على 258 مريضاً (129 ذكراً و 129 أنثى) في ثلاث عيادات أسنان مختلفة في منطقة طرابلس (مركز طرابلس الطبي ، ومستشفى التجميل والحروق ، ومصحة العالمين) لتحديد الجرعة الممتصة وعوامل الخطر الناتجة عن التعرض البانورامي للمرضى الناتج عن ذلك التصوير. تم استخدام مقاييس جرعات OSL للحصول على الجرعة الممتصة في الأعضاء والأنسجة الحساسة في منطقة الرأس والرقبة أثناء التصوير الشعاعي البانورامي ، بناءً على قياس المريض. كان متوسط الجرعة الكلية لسطح المدخل في الصورة البانورامية $20 \mu\text{Sv}$ وعوامل الخطر كانت 5 ، 10 ، 25 لكل 10000 حالة لمركز طرابلس الطبي ومستشفى التجميل والحروق ومصحة العالمين على التوالي. أظهرت النتائج عدم وجود فروق بين جرعات المرضى التي تم فحصها بواسطة أنظمة بانورامية مختلفة في وحدات الأماكن الثلاثة المختلفة وتم تخفيضها مقارنة بنتائج وفقاً لهذه الدراسة ، يوجد فرق كبير في عامل الخطر وفقاً للجنس (الذكور أكبر من الإناث) بالنسبة للجهاز البانورامي المستخدم في طرابلس الطبي وكذلك العيادة مركزية بينما بالنسبة لمستشفى الجراحة التجميلية لا يوجد فرق كبير في المخاطر فيما يتعلق بالجنس .

أيضاً بالنسبة للجهاز البانورامي لمستشفى طرابلس للطب والجراحة التجميلية توجد فروق ذات دلالة إحصائية في متوسط الشدة حسب اختلاف العمر لكل من الذكور والإناث والتي توضح بطريقة One Way ANOVA

Abstract

A preliminary Panoramic imaging study was conducted on 258 patients (129 male, 129 female) at three different dental clinics at Tripoli region (Tripoli medical center , Plastic surgery hospital and Alamine clinic) to determine the absorbed dose and risk factor resulting from panoramic exposure to the patients resulting from that imaging. OSL dosimeters were used to obtain the absorbed dose in organs and sensitive tissues in head and neck region during panoramic radiography, based on patient measurement. The overall mean entrance surface dose in panoramic were $20 \mu\text{Sv}$ and the risk factors were 5 , 10 25 per 10000 cases for Tripoli medical center , Plastic surgery hospital and Alamine clinic, respectively. The results show that there are no differences between patient doses examined by different panoramic systems at the three different places units and were lowered compared with

literature review result . according to this sample study there is significance difference in risk factor according to gender (male greater than female) for panoramic device used in Tripoli medical as well as Alamine private hospital, while for Plastic Surgery hospital there is no significance difference in risk regarding to gender. Also for panoramic device of Tripoli medical and Plastic surgery hospital there are statistically significant differences in the average severity according to the difference in the age for both male and female which clarify by One Way ANOVA method

Introduction

Although the amount of radiation utilized in dentistry is typically fairly low,(White SC. 1992) and (JDSR 2010) [15,16] acceptable radiological policies and practices are based on the assumption that some risk does exist, and this risk must be clearly outweighed by benefits, *i.e.* the quantity and quality of needed diagnostic information, (Tyndall DA et al 2000), (UNSCEAR 2000) and (JDSR 2010). Adverse effects of radiation are grouped into two categories: deterministic effects and stochastic effects (ICRP 1990 and ICRP 2007), (P.P. Hujoel, et al 2004) & (Ludlow. JB et al 2008). Granlund C. et al 2016 reported that the salivary glands and the oral mucosa received the highest absorbed doses from both intraoral and panoramic radiography . The effective dose from a full-mouth intraoral examination was 15 μSv and for panoramic radiography, the effective dose was in the range of 19-75 μSv , depending on the panoramic equipment used. Besides, (Gijbels et al 2007) proved that the effective radiation doses ranged from 4.7 μSv to 14.9 μSv for various digital panoramic units with a head phantom using the 2005 recommendations of the International commission of Radiation Protection (ICRP). Consequently, a number of studies globally have been investigating possible methods to minimize radiation dose to patients and occupational people who concern to radiation field from panoramic imaging without compromising the image quality required for diagnostic accuracy. It is inappropriate to impose strict limits on the doses received by patients for medical purposes. The effective dose concept, according to the International Commission for Radiological Protection (ICRP) report (E_{ICRP60}) in conventional panoramic radiography was 17 μSv and E_{SAL} was 26 μSv .

The respective values in digital panoramic radiography $E_{\text{ICRP60}} = 23 \mu\text{Sv}$ and $E_{\text{SAL}} = 38 \mu\text{Sv}$, while using the lowest possible radiographic E_{ICRP60} was 8 μSv and E_{SAL} was 12 μSv . (G Sophia et al 2008). As a result, the purpose of this concept was to provide the first step in the optimization of patient doses and identify those practices in great and urgent need of intervention. This has led to the International Commission on Radiological Protection (ICRP), the organization that is now regarded as the most authoritative in the field of information on radiation and radiation protection. In most countries, the

law governing radiation is based on the three principles of the (ICRP): justification, as low as reasonably achievable (ALARA), and dosage limits. The Practice Guidelines on Radiology are available for the practical implementation of the regulations. In Libya, according to limited data that is available, the use of the panoramic image services started as early as 1980, for example in Academic hospital of dentistry college in Tripoli University about 2000 panoramic images are annually taken. In view of this trend, it is almost certain that there will be an increased use of this high dose procedure in future. Unfortunately, however, the current increasing trend of acquisition of panorama in Libya without the knowledge on radiation dose from panoramas would make it difficult to assess the extent to which radiation dose to patient from panoramas is optimized in Libya. This is a preliminary study to investigate the need and urgency to establish radiation dose from panoramic images in Libya.

To date, no studies have been published regarding measuring and comparing radiation doses for oral and panoramic dental radiography in Libya. Thus, this study aims to estimate patient radiation doses and risk factor for panoramic dental radiography in different dental clinic at Tripoli region . The measured doses will serve as a baseline data for optimization of the radiation protection and contribute to the development of national diagnostic reference levels in Libya.

Experimental Procedures

A total of 258 cases were included in this study and divided them among three hospitals within the Tripoli area (Tripoli medical center, Plastic surgery hospital and Alamin private clinic) . Each group consists 86 cases (43 male and 43 female)

In each examination, information about patient and panoramic parameters were collected for each center such as: age, sex, peak voltage (kVp) and exposure setting (mAs). The patients age for male and female (18- 60 years) . A total of 10 OSL dosimeters were read in this study. Mean value of absorbed dose by two OSL placed on the skin surface of patients at the point of interest was obtained. Quality control test was performed on panoramic machines: accuracy of kilo-voltage, accuracy of timer controls, exposure consistency according to radiation guideline reference (50).

All the machine parameters for the three hospitals and doses for each patients were given in Table (5.1) as well as some panoramic images were also shown in Fig 1-

Table 5-1 shows effective dose and risk factor for some of female patients at Plastic surgery hospital whom performing panoramic image model Sirona at 80 Kvp and mAs 0. 2

No	Age	Sex	Effective Dose (mSv)	Cancer risk factor /10 ⁴
1.	18	F	0.02	40.1
2.	19	F	0.02	38.8
3.	20	F	0.02	37.5
4.	21	F	0.02	36.2
5.	22	F	0.02	35.0

6.	23	F	0.02	33.9
7.	24	F	0.02	32.7
8.	25	F	0.02	31.6
9.	26	F	0.02	30.6
10.	27	F	0.02	29.5
11.	28	F	0.02	28.6
12.	29	F	0.02	27.6
13.	30	F	0.02	26.7
14.	31	F	0.02	25.8
15.	32	F	0.02	24.9
16.	33	F	0.02	24.1
17.	34	F	0.02	23.3
18.	35	F	0.02	22.5
19.	36	F	0.02	21.8
20.	37	F	0.02	21.0

Table 1-2 shows effective dose and risk factor for male patients at Plastic surgery hospital whom performing panoramic image model Sirona at 80 Kvp and mAs 0.2

N0	Age	Sex	Effective Dose (mSv)	cancer risk factor /10 ⁴
1	18	M	0.02	24.4
2	19	M	0.02	23.7
3	20	M	0.02	23.1
4	21	M	0.02	22.5
5	22	M	0.02	21.8
6	23	M	0.02	21.3
7	24	M	0.02	20.7
8	25	M	0.02	20.1
9	26	M	0.02	19.6
10	27	M	0.02	19.0
11	28	M	0.02	18.5
12	29	M	0.02	18.0
13	30	M	0.02	17.5
14	31	M	0.02	17.1
15	32	M	0.02	16.6
16	33	M	0.02	16.1
17	34	M	0.02	15.7
18	35	M	0.02	15.3
19	36	M	0.02	14.9
20	37	M	0.02	14.5

Table 1-3 shows effective dose and risk factor for some of female patients at Tripoli Medical hospital whom performing panoramic image model Torphy at 70 Kvp and mAs 0.8

No	Age	Sex	Effective Dose (mSv)	cancer risk factor /10 ⁴
.1	18	F	0.008	16.1
.2	19	F	0.008	15.5
.3	20	F	0.008	15.0
.4	21	F	0.008	14.5
.5	22	F	0.008	14.0
.6	23	F	0.008	13.5
.7	24	F	0.008	13.1
.8	25	F	0.008	12.7
.9	26	F	0.008	12.2
.10	27	F	0.008	11.8
.11	28	F	0.008	11.4
.12	29	F	0.008	11.0
.13	30	F	0.008	10.7
.14	31	F	0.008	10.3
.15	32	F	0.008	10.0
.16	33	F	0.008	9.6
.17	34	F	0.008	9.3
.18	35	F	0.008	9.0
.19	36	F	0.008	8.7
.20	37	F	0.008	8.4

Table 1-4 shows effective dose and risk factor for some of male patients at Tripoli Medical hospital whom performing panoramic image model Torphy at 70 Kvp and mAs 0.8

No	Age	Sex	Effective Dose (mSv)	cancer risk factor /10 ⁴
.1	18	M	0.008	9.8
.2	19	M	0.008	9.5
.3	20	M	0.008	9.2
.4	21	M	0.008	9.0
.5	22	M	0.008	8.7
.6	23	M	0.008	8.5
.7	24	M	0.008	8.3
.8	25	M	0.008	8.0
.9	26	M	0.008	7.8
.10	27	M	0.008	7.6
.11	28	M	0.008	7.4
.12	29	M	0.008	7.2
.13	30	M	0.008	7.0
.14	31	M	0.008	6.8
.15	32	M	0.008	6.6
.16	33	M	0.008	6.5
.17	34	M	0.008	6.3
.18	35	M	0.008	6.1
.19	36	M	0.008	5.9
.20	37	M	0.008	5.8

Table 1-5 shows effective dose and risk factor for some of female Almine private clinic whom performing panoramic image model Kavo at 73 Kvp and mAs 9.6

No	Age	Sex	Effective Dose (mSv)	cancer risk factor /10 ⁴
.1	18	F	0.01	20.1
.2	19	F	0.01	19.4
.3	20	F	0.01	18.7
.4	21	F	0.01	18.1
.5	22	F	0.01	17.5
.6	23	F	0.01	16.9
.7	24	F	0.01	16.4
.8	25	F	0.01	15.8
.9	26	F	0.01	15.3
.10	27	F	0.01	14.8
.11	28	F	0.01	14.3
.12	29	F	0.01	13.8
.13	30	F	0.01	13.3
.14	31	F	0.01	12.9
.15	32	F	0.01	12.5
.16	33	F	0.01	12.0
.17	34	F	0.01	11.6
.18	35	F	0.01	11.3
.19	36	F	0.01	10.9
.20	37	F	0.01	10.5

Table 1-6 shows effective dose and risk factor for some of male patients at Almine private clinic whom performing panoramic image model kavo at 73 Kvp and mAs 9.6

No	Age	Sex	Effective Dose (mSv)	cancer risk factor /10 ⁴
.1	18	M	0.01	12.2
.2	19	M	0.01	11.9
.3	20	M	0.01	11.5
.4	21	M	0.01	11.2
.5	22	M	0.01	10.9
.6	23	M	0.01	10.6
.7	24	M	0.01	10.3
.8	25	M	0.01	10.1
.9	26	M	0.01	9.8
.10	27	M	0.01	9.5
.11	28	M	0.01	9.3
.12	29	M	0.01	9.0
.13	30	M	0.01	8.8
.14	31	M	0.01	8.5
.15	32	M	0.01	8.3
.16	33	M	0.01	8.1
.17	34	M	0.01	7.9
.18	35	M	0.01	7.6
.19	36	M	0.01	7.4
.20	37	M	0.01	7.2

Results and Discussion

A total of 86 cases were taken. The number of cases were 43 males, and

females, and these referrals were from three different dental clinics inside Tripoli, including the (Tripoli Medical center, plastic surgery hospital and Al-alamine private hospital)

The data were distributed according to gender as shown in Table 7

Table No. (7) shows the frequency distribution of the respondents by gender.

Sex	Percent	Frequency
M	50%	43
F	50%	43
Total	% 100.00	86

.In order to make statistical analysis for our data several questions have been made

The first question

What is the average degree of risk in each of the three different panoramic devices which have been used in the three different hospitals?. According to our study samples which are shown in Table (1.8).

Table (1.8) shows the average degree of risk red by three devices

Risk	N	Maximum	Minimum	Mean	Std. Deviation
T Risk	86	16.10	3.10	7.1837	3.21035
P Risk	86	40.10	7.70	17.9744	8.01754
Al Risk	86	20.10	3.80	8.9837	4.01157

T= Medical University Hospital

P= Plastic surgery

Al= Alamin Clinic

The second question

Are There statistically significant differences at the level of **(0.05)** between the level of severity of the three devices according to the gender variable?.

To identify whether there were statistically significant differences in the mean severity degree according to the difference in the sex variable in the three devices, the test was used "**Independent Sample T-test**" and the results were shown in table (1.8) .

Table (1.8) the number Of differences in averages:" **Independent Sample" Test** results "**T** " according to the difference in the sex variable

	Sex	N	Mean	Std. Deviation	Df	T	Sig. (2-tailed)	Indication
T Risk	M	43	5.79	41.98	84	4.44	0.000	Significance when 0.05
	F	43	8.58	93.59		6		
P Risk	M	43	14.50	14.95	84	4.43	0.000	Significance when 0.05
	F	43	21.45	8.994		5		
Al Risk	M	43	7.25	2.474	84	4.43	0.000	Significance when 0.05
	F	43	10.72	4.502		5		

Of differences in averages:" **Independent Sample" Test** results "**T** " according to the difference in the sex variable

It is evident from the table that the value of "**T**" calculated for the Medical University Hospital device according to the variable of gender (**4.446**) is greater than the tabular value of "**T**" which equals (**1.96**) and the level of significance is less than the level of significance adopted in the study , which is (**0.05**) and this indicates existence of statistically significant differences at the level of (**0.05**)

Regarding to the risk of the Tripoli Medical center device according to the male gender variable .The calculated value of "**T**" for the Plastic Surgery hospital device and the gender variable (**4.435**) is greater than the tabular value of "**T**" which equals (**1.96**) and the level of significance is less than the level of significance adopted in the study, which is **0.05** the indicates that are statistically significant differences at the level of 0.05 in the level of risk of the Plastic Surgery hospital device according to the gender variable in favor of males, it is also clear from the table that the value of "**T**" calculated for the Alamin Clinic device according to the gender variable (**4.435**) is greater than the tabular "**T**" value equal to (**1.96**) and the level of significance is less than the level of significance adopted in the study, which is **0.05** and this indicates existence of statistically significant differences at the level of **0.05** in the level of risk the Alamin Clinic device according to the gender variable in favor of males

The third question

Are there statistically significant differences at the level of **0.05** between the level of severity of the Medical University Hospital apparatus according to the age variable?

To identify whether there are statistically significant differences in the average measure

of severity according to the difference in the age variable to clarify the significance of **(One Way ANOVA)** a single analysis of variance was used and the results as shown in the following table

T Risk	N	Mean		Sum of Squares	D f	Mean Square	F	Sig.
less than 20	14	8.529	Between Groups	264.870	4	66.217	8.776	0.000**
21-30	24	9.121	Within Groups	611.168	81	7.545		
31-40	21	6.986	Total	876.037	85			
41-50	17	5.388						
51-60	10	4.120						

** significant differences at the **0.05** level ** significant differences at the level **0.01** or less

It is evident from Table No. **(1.9)** that the value of "T" calculated for the level of risk of Tripoli Medical center device is equal to **(8.776)** and it is greater than the tabular value of "T" by two degrees of freedom **(4) (81)** at the level of significance **(0.05) 2.46** and since the calculated value of T is greater than the tabular and level of moral significance it is equal to **(0.000)** which is less than **0.05** the level of significance adopted in the study, which indicates that there are differences in the level of risk of the Medical University Hospital apparatus with different age .

The fourth question:

Are there statistically significant differences at **0.05** level between the severity level of the Plastic Surgery hospital device according to the age variable ? To identify whether there are statistically significant differences in the average severity according to the difference in the age variable to clarify the significance of **(One Way ANOVA)** a single analysis of variance was used and the results were as shown in the following table

P Risk	N	Mean		Sum of Squares	Df	Mean Square	F	Sig.
less than 20	13	20.24	Between Groups	1854.553	4	463.638	10.405	**0.000
21-30	21	24.80	Within Groups	3609.331	81	44.560		
31-40	27	16.00	Total	5463.884	85			
41-50	19	14.45						
51-60	6	9.16						

*significant differences at level **0.05** ** significant differences at the level **0.01** and below

It is evident from Table No. (1.10) that the value of "T" calculated for the level of risk of the plastic Surgery hospital is equal to (10.405) and it is greater than the tabular value of "T" by two degrees of freedom (4) (81) at the level a significant (0.05) 2.46 and since the calculated value of "T" is greater than the tabular, and the level of moral significance is equal to (0.000) and it is less than (0.05) the level of significance adopted in the study, which indicates that there are differences in the level of risk of the Plastic Surgery hospital apparatus with different age .

The fifth question :

Are there statistically significant differences at **0.05** level between the level of risk at the Alamin Clinic facility according to the age variable ?

To identify whether there are statistically significant difference in the average sverage severity according to the difference in the age variable to clarify its significance "(ONE WAY ANOVA)" use the moon-analysis of variance and the results are shown in the following table:

M Risk	N	Mean		Sum Squares	df	Mean Square	F	Sig
Less than 20	14	9.60	Between Groups	456.889	4	114.222	10.156	0.000
21-30	23	12.00	Within Groups	910.988	81	11.247		
31-40	24	8.87	Total	1367.877	85			
41-50	15	6.58						
51-60	10	5.05						

* Significant differences at the **0.05** level

** Significant difference at the level of **0.01** or less

It is evident from Table No. (1.11) that the value of "T" calculated for the level of risk

of the Alamin Clinic is equal to **(10.156)** it is greater than the tabular value of "T" by two degrees of freedom **(4) (81)** at a level of significance **(0.05) 2.46** and since the calculated value of "T" is greater than the tabular(T) and the level of significant significance is equal to **(0.000)** it is less than **(0.05)** the level of significance adopted in the study, which indicates that there are differences in the level of risk of the Alamin Clinic apparatus with different age .

According to male ages;

The sixth question :

Are there statistically significant differences at the level of **0.05** between the level of severity of the medical university Hospital apparatus according to the variable of male age ?

To identify whether there are statistically significant differences in the mean risk measurement according to the difference in the age variable to clarify the significance of **(One Way ANOVA)** use the single- way analysis of variance and the results are as shown in the following table :

T Risk	N	Mean		Sum Squares	df	Mean Square	F	Sig
Less than 20	5	7.46	Between Groups	71.598	4	17.899	7.262	0.000
21-30	13	6.94	Within Groups	93.658	38	2.465		
31-40	12	5.65	Total	165.256	42			
41-50	9	4.52						
51-60	4	3.25						

* Significant differences at the **0.05** level

** Significant difference at the level of **0.01** or less

It is evident from Table No. **(1.12)** that the calculated value of "T" for the level of risk for the Medical University Hospital device is equal to **(7.262)** and it is greater than the tabular value of "T" for the two degrees of freedom **(4) (38)** at a level of significance **(0.05) 2.69** and since the calculated value of "T" is greater than the tabular and the level of moral significance equals to **(0.000)** it is less than **(0.05)** the level of significance adopted in the study, which indicates that there are differences in the level of risk of the Medical University Hospital apparatus with different age.

The seventh question:+

Are there statistically significant differences at the level of **0.05** between the level of severity of the Plastic Surgery hospital device according to the male age variable ?

To identify whether there are statistically significant differences in the mean risk measurement according to the difference in the age variable to clarify the significance of (**One Way ANOVA**) use the single- way analysis of variance and the results are as shown in the following table

H Risk	N	Mean		Sum Squares	df	Mean Square	F	Sig
Less than 20	6	16.43	Between Groups	551.168	4	137.792	10.948	0.000
21-30	10	19.90	Within Groups	478.262	38	12.586		
31-40	15	13.30	Total	1029.430	42			
41-50	8	11.61						
51-60	4	8.40						

* Significant differences at the **0.05** level

** Significant difference at the level of **0.01** or less

It is evident from Table No. (1.13) that the value of "T" calculated for the level of risk in plastic Surgery hospital device is equal to (10.948) which is greater than the tabular value of "T" for two degrees of freedom (4) (81) at the level of significant (0.05) 2.69, and since the calculated value of "T" is greater than the tabular, and the level of moral significance it is equal to (0.000) which is less than (0.05) the level of significance adopted in the study, which indicates that there are differences in the level of risk of the Plastic Surgery hospital apparatus different age .

The eighth question:

Are there statistically significant differences at the **0.05** level between the level of severity of the Alamin Clinic device according to the male age variable ?

To identify whether there are statistically significant differences in the mean risk measurement according to the difference in the age variable to clarify the significance of (**One Way ANOVA**) use the single- way analysis of variance and the results are as shown in the following table :

M Risk	N	Mean		Sum Squares	df	Mean Square	F	Sig
Less than 20	7	7.58	Between Groups	108.267	4	27.067	6.908	0.000
21-30	11	9.48	Within Groups	148.880	38	3.918		
31-40	11	7.09	Total	257.147	42			
41-50	10	5.88						
51-60	4	4.35						

* Significant differences at the **0.05** level** Significant difference at the level of **0.01** or less

It is evident from Table No. (1.14) that the calculated value of "T" for the level of risk of the Alamin Clinic is equal to (6.908) which is greater than the tabular value of "T" for the two degrees of freedom (4) (38) at the level of significance (0.05) 2.69 and since the calculated value of "T" is greater than the tabular(T) and the level of significant significance is equal to (0.000) which is less than (0.05) the level of significance adopted in the study, which indicates that there are differences in the level of risk of the Alamin Clinic apparatus with different age.

According to the ages of the femals;

The nine question:

Are there statistically significant differences at the **0.05** level between the level of severity of the Medical University Hospital device according to female age variable ?

To identify whether there are statistically significant differences in the mean risk measurement according to the difference in the age variable to clarify the significance of (One Way ANOVA) use the single- way analysis of variance and the results are as shown in the following table :

T Risk	N	Mean		Sum Squares	df	Mean Square	F	Sig
Less than 20	9	9.12	Between Groups	239.702	4	59.926	7.486	0.000
21-30	11	11.70	Within Groups	304.194	38	8.005		
31-40	9	8.76	Total	543.897	42			
41-50	8	6.36						
51-60	6	4.70						

* Significant differences at the **0.05** level** Significant difference at the level of **0.01** or less

It is evident from Table No. (1.15) that the calculated value of "T" for the level of risk

for a Medical University Hospital device is equal to **(7.486)** and it is greater than the tabular value of "T" for the two degrees of freedom **(4) (38)** at a level of significance **(0.05) 2.69** and since the calculated value of "T" is greater than the tabular and the level of moral significance equals to **(0.000)** it is less than **(0.05)** the level of significance adopted in the study, which indicates that there are differences in the level of risk of the Medical University Hospital apparatus with different age

The tenth question: Are there statistically significant differences at the **0.05** level between the level of severity of the Plastic Surgery hospital device according to the female age variable ?

H Risk	N	Mean		Sum Squares	df	Mean Square	F	Si g
Less than 20	7	23.51	Between Groups	1253.318	4	313.329	5.552	0.000
21-30	11	29.27	Within Groups	2144.369	38	56.431		
31-40	12	19.37	Total	3397.687	42			
41-50	11	16.51						
51-60	2	10.70						

To identify whether there are statistically significant differences in the mean risk measurement according to the difference in the age variable to clarify the significance of (One Way ANOVA) use the single- way analysis of variance and the results were as shown in the following table :

* Significant differences at the **0.05** level

** Significant difference at the level of **0.01** or le

It is evident from Table No. **(1.16)** that the calculated value of "T" for the level of risk of a Medical University Hospital device is equal to **(5.552)** and it is greater than the tabular value of "T" for the two degrees of freedom **(4) (38)** at the level of significance **(0.05) 2.69** and since the calculated value of "T" is greater than the tabular and the level of moral significance equals to **(0.000)** which is less than **(0.05)** the level of significance adopted in the study, which indicates that there are differences in the level of risk of the Plastic Surgery hospital apparatus with different age.

The eleventh question:

Are there statistically significant differences at the **0.05** level between the level of severity of the Alamin Clinic device according to the female age variable ?

To identify whether there are statistically significant differences in the mean risk measurement according to the difference in the age variable to clarify the significance of (**One Way ANOVA**) use the single- way analysis of variance and the results were as shown in the following table :

M Risk	N	Mean		Sum Squares	Df	Mean Square	F	Sig
Less than 20	7	11.61	Between Groups	362.347	4	90.587	7.042	0.000
21-30	12	14.31	Within Groups	488.845	38	12.864		
31-40	13	10.37	Total	851.191	42			
41-50	5	7.98						
51-60	6	5.51						

* Significant differences at the **0.05** level

** Significant difference at the level of **0.01** or less

It is evident from Table No. (1.17) that the calculated value of "T" for the level of risk of the Alamin Clinic device is equal to (7.042) and it is greater than the tabular value of "T" for the two degrees of freedom (4) (38) at the level of significance (0.05) 2.69 and since the calculated value of "T" is greater than the tabular and the level of moral significance equals to (0.000) which is less than (0.05) the level of significance adopted in the study, which indicates that there are differences in the level of risk of Alamin Clinic apparatus with different age.

CONCLUSIONS

according to this sample study there is significance difference in risk factor according to gender (male greater than female) for panoramic device used in Tripoli medical as well as Alamine private hospital, while for Plastic Surgery hospital there is no significance difference in risk regarding to gender.

Also for panoramic device of Tripoli medical and Plastic surgery hospital there are statistically significant differences in the average severity according to the difference in the age for both male and female which clarify by One Way ANOVA method.

Acknowledgements

This work was carried out in ABOSALEM Trauma Hospital

References

- [1]- White SC. 1992 assessment of radiation risk from dental radiography. *Dentomaxillofac Radiol* 1992; 21: 118–126.
- [2]- Tyndall DA, Brooks SL. Selection criteria for dental implant site imaging: a position paper of the American Academy of Oral and Maxillofacial Radiology. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2000; 89: 630–637. CrossRef, Medline.