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Evaluation of a Newly Designed Computerized Data Base for Clinical Orthodontic Decision.

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الخلاصة

هدف الدراسة: الحالية هو تصميم جدول بياني تشخيصي رقمي خاص بمرضى تقويم الأسنان ولمساعدة اختصاصي التقويم باتخاذ القرار المناسب في التشخيص والعلاج باستخدام برنامج(أكسس) لتحديد العلاج المثالي والجهاز الأفضل لمريض التقويم. **مواد وطرق البحث:** الجدول البياني التشخيصي الرقمي المعد باستخدام برنامج(أكسس) يتضمن ستة عشر برنامج فرعي للفحص والتشخيص والعلاج.من اجل تقييم هذا الجدول البياني،استخدم تحليل الانحدار الخطي المتعدد..يهدف هذا التحليل إلى إظهار أهمية وقوة واتجاه العوامل(26عامل مستقل أو ثابت)وتأثيرها على 12عامل معتمد(تخمين العوامل).آخذت المعلومات من 50 ملف خاص بمرضى التقويم الذين ارتادوا قسم تقويم السنان التابع لكلية طب السنان في جامعة الموصل والذين عولجوا باستخدام جهاز التقويم المتحرك من قبل طلاب المرحلة الخامسة سنة 2007-2008.تأثير العوامل المستقلة يتفاوت بين السالب والموجب وأحيانا صفر اعتمادا على العامل المعتمد المدروس. **النتائج:** قيمة (R) التربيعية تقيس نسبة الاختلاف في المتغير المعتمد في معادلة الانحدار.اقل اختلاف كان في Y1 (إطباق الطاحن العلوي الأيمن) ،بينما أعلى قيمة للاختلاف وجدت في Y4 (إطباق الناب العلوي الأيسر)،قيمة R-sq للمتغيرات المستقلة كالأتي :

{y1=0.0%, y2=57.8%, y3= 41.1%, y4=65 . 6%, y5=32.0%, y6 = 50.9%, y7= 60.5%, y8=62.8%, y9=51.6%, y19=61.3%, y11=28.2% , y12=51.5%},

كل قيمة تمثل أهمية و قوة واتجاه العوامل المستقلة وتأثيرها على العوامل المعتمدة. **الاستنتاجات:**تم تحضير جدول بياني تشخيصي رقمي خاص بمرضى تقويم الأسنان.ابتكار جدول بياني رقمي يتضمن استخدام تقنية معلوماتية مع تحليل متماسك للمساعدة في التشخيص التقويمي للمساهمة المناسبة في تطوير العناية بمرضى التقويم في قسم الأطفال والتقويم والوقاية التابع لكلية طب الأسنان في جامعة الموصل.

ABSTRACT

Aims: To prepare a newly designed diagnostic digital chart for orthodontic patients, and to help orthodontist making decision in term of diagnosis and treatment planning by using Access program to determine the ideal orthodontic treatment of a patient to provide optimum orthodontic appliances for such treatment. **Materials and Methods:** A newly designed diagnostic digital chart for orthodontic patients was designed using Access program containing sixteen program forms of examination, diagnosis and treatment plan. In order to evaluate this newly designed digital chart, Multiple Linear Regression Analysis was used. This analysis aims to reveal the importance, strength and direction of factors (26 independent variables= constant variables) and their effects on the 12 dependent variables (random variables) [parameter estimation],all of which representing the information and data taken from fifty randomly selected orthodontic patients' files available in the Department of Orthodontics-College of Dentistry-University of Mosul, who were treated with removable appliances by dental students of fifth class during year 2007-2008. The effects of the independent variables vary in negative or positive way, or even may have zero effect depend on the studied dependent variable. **Results :**R square measures the proportion of the variability in the dependent variable about the origin explained by regression. The least variability is in y1(right 1st molar occlusion),where as the highest one in y4(left canine occlusion),{R-Sq for y 1 =0.0%, y2=57.8%, y3= 41.1%, y4=65.6%, y5=32.0%, y6 = 50.9%, y7= 60.5% , y8=62.8%, y9=51.6%, y19=61 .3%, y11=28.2% and y12=51.5%}, each value representing the importance, strength and direction of independent factors and their effects on the dependent factors. **Conclusions:** New digital orthodontic examination and diagnosis chart was prepared. The creation of a digital chart that combines the use of information technology with a consistent analysis to aid orthodontic diagnosis will be a relevant contribution to the improvement of orthodontic care in POP Department in College of Dentistry/Mosul University.

Key words: Database, Diagnosis, Digital, Information managements, Orthodontic soft ware.

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INTRODUCTION

Computer uses in orthodontics are not entirely new. The history of computer applications for orthodontics can be traced back for decades. [1] The scope of computer use in orthodontics is enormous. It finds applications from simple databases for orthodontics practice to complex image processing techniques for efficient diagnosis. [2] Precision in orthodontic diagnosis can increase the chance of therapeutic success.[3]Patients records are very important for the consistency of the decisions to be taken in orthodontic treatment.[3] According to Forsyth et.al, [4] orthodontic records based on computerized systems benefit from image storage, data transmission and processing. Computerized systems are widely used, making digital formats usual in obtaining photos, radiographs, cephalometric landmarks, linear and angular measurements and treatment planning to make up patients records.[3]

Different orthodontic computerized systems are developed: (prototype) system , created from a printed table of the Cranial Facial Analysis and Total Dentition Space Analysis with Difficulty Index – Tweed-Merrifield Analysis – in order to aid orthodontic diagnosis.[3] OSD (orthodontic simulation and diagnosis) system, which provides 3-D measurement of dental casts to the dentists.[5]The OPAS System (The Orthodontic Patient Administration System (OPAS©, 'cTc' Software, Manchester, UK)) was developed from a relationship between a hospital orthodontic consultant and a software programmer.[6] [Advanced Ortho Systems, ASOS Products, Absolutely Simple Orthodontic Software (ASOS) ,Exceptional Software ,Just-Swipe-It ,Kodak Dental Systems ,New Horizons Software Inc ,Oasys Practice ,Ortho Computer Systems, Ortho Chart and Virtual Intercom]; these softwares offer a practice-management software package that features appointment scheduling with editable, color-coded procedures. Appointment times can be found manually or with the automatic search engine .Also follows patients from their first visit to their follow-up and retention visits and tracks appointments, billing, communications, and patient information.[7]

The purpose of the present study is to prepare a newly designed diagnostic digital chart for orthodontic patients, and to help orthodontist making decision in term of diagnosis and treatment planning by using Access program for determining the ideal orthodontic treatment of a patient to provide optimum orthodontic appliances for such treatment.

MATERIALS AND METHODS

A newly designed diagnostic digital chart for orthodontic patients was designed using Access program containing sixteen program forms (Figure-1) of examination , diagnosis and treatment plan as following:

1. Personal information. 2. Chief complaint. 3. Medical history.
4. Dental history. 5. Orthodontic examination

A-Extra-oral examination

1. Dental casts analysis
2. Photographs
3. Radiographic interpretation

I-Lateral cephalometric radiograph analysis
II-Panoramic radiograph analysis
III-Other radiographs

4. Orthodontic problem list
5. Treatment objectives(in response to problem list)
6. Treatment plan
7. Treatment options: (orthodontic apliances)
8. Prognosis of case
9. Retention
10. Cost of treatment
11. Supervisor's name and signature.

In order to evaluate this newly designed digital chart, Multiple Linear Regression Analysis was used. This analysis aims to reveal the importance, strength and direction of factors (26 independent variables=constant variables) and their effects on the 12 dependent variables (random variables) [parameter estimation], [8]all of which representing the information and data taken from fifty randomly selected orthodontic patients' files available in the department of orthodontics-College of Dentistry-University of Mosul, who were treated with removable appliances by dental students of fifth class during year 2007-2008.

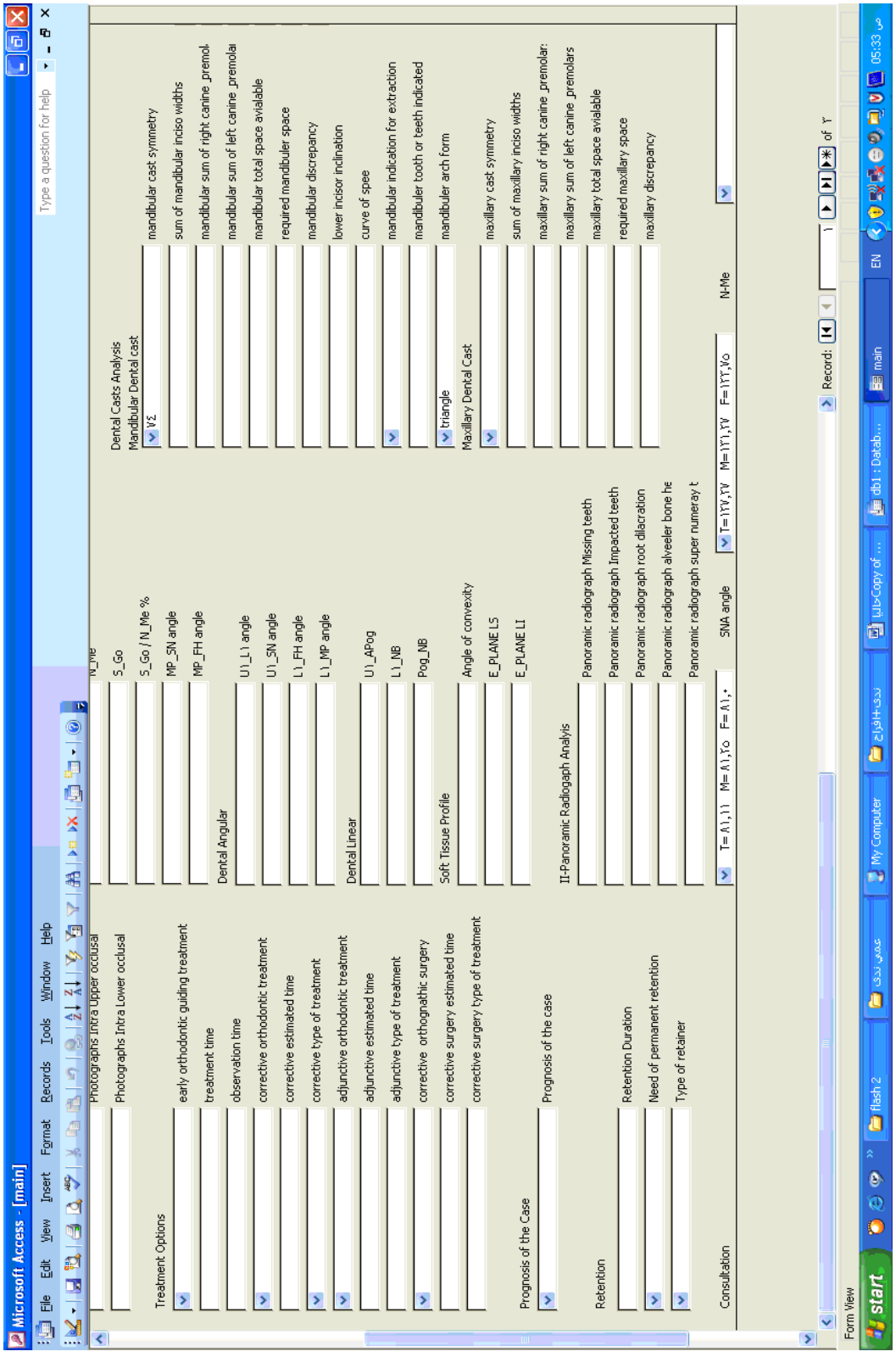


Figure (1): The Newly Designed Digital Orthodontic Examination and Diagnosis Chart.

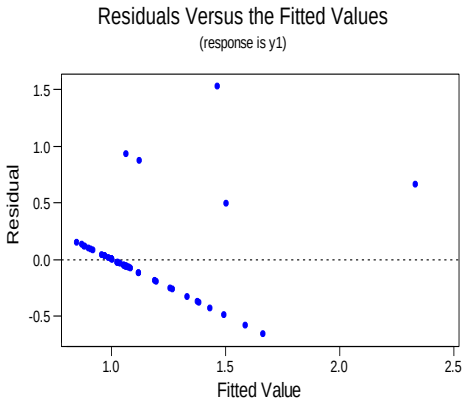
The independent variables are: x1=main complaint, x2= medical history, x3=speech problem, x4=teeth gringing, x5= lip bitting, x6=family history of orthodontic problem, x7=family history of orthodontic treatment, x8=patient's regular dental treatment, x9=wind instrument playing, x10=shape of face, x11=facial profile, x12=facial symmetry, x13= lips' relationship, x14=lips' competence, x15= lip

length, x16= breathing, x17= missing teeth, x18= extracted teeth, x19=impacted teeth, x20=hypo-calcified teeth, x21= abnormalities in teeth, x22=supernumerary teeth, x23=periodontal condition , x24 = oral hygiene, x25=habits , and x26=TMJ.
While the dependent variables are: y1=right 1st molar occlusion, y2= left 1st molar occlusion, y3= right canine occlusion, y4= left canine occlusion, y5 =crowding, y6=cross bite, y7=open bite, y8=spacing, y9=upper midline, y10=lower midline, y11= overjet, y12=over bite.
Multiple linear regression analysis was performed with the Minitab Program loaded in Pentium IV Computer to find the relationship between 26 independent or predictor variables and 12 dependent or criterion variables. The information obtained can be used in a multiple linear regression analysis to build a regression equation (Table 1) and (Figure 2).

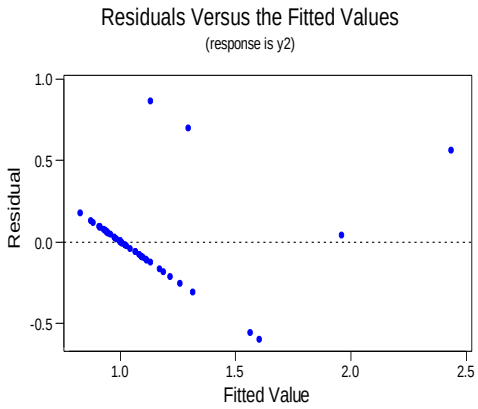
Table (1): Multiple Linear Regression Analysis for independent and dependent variables.

Dependent variable	Independent variable	Regression equation	R-Sq	R-Sq(adj)	SE
Y1	X1-X26	y1 = 1.69 - 1.34 x2 - 0.708 x3 + 1.18 x4 + 0.523 x5 - 0.423 x6 + 0.094 x8 + 0.575 x9 - 0.040 x10 - 0.013 x11 - 0.384 x12 - 0.156 x13+ 0.082 x14 - 0.061 x15 - 0.053 x16 + 0.317 x17 - 0.039 x18 - 0.473 x19 + 0.468 x21 + 0.010 x23 - 0.011 x24 + 0.255 x25 – 0.733 x26	0.0%	33.0%	0.4985
Y2	X1-X26	y2 = 0.970 - 1.39 x2 - 0.496 x3 + 1.37 x4 + 0.596 x5 - 0.623 x6 + 0.008 x8 + 0.539 x9 + 0.075 x10 - 0.060 x11 - 0.359 x12 - 0.065 x13 - 0.0292 x14 + 0.076 x15 + 0.152 x16 - 0.031 x17 + 0.109 x18 + 0.247 x19 - 0.074 x21 - 0.084 x23 + 0.208 x24 - 0.124 x25 + 0.139 x26	57.8%	23.5%	0.3186
Y3	X1-X26	y3 = 2.20 - 0.548 x2 - 0.520 x3 + 0.210 x4 + .502 x5 - 0.667 x6 + 0.301 x8 + 0.072 x9 - 0.107 x10 - 0.009 x11 - 0.778 x12 + 0.198 x13 - 0.030 x14 - 0.050 x15 + 0.027 x16 + 0.018 x17 - 0.000 x18- 0.090 x19 + 0.340 x21 + 0.069 x23 - 0.279 x24 - 0.061 x25 - 0.295 x26	41.1%	0.0%	0.3623
Y4	X1-X26	y4 = 2.15 - 0.331 x2 - 1.12 x3 + 0.434 x4 + 1.04 x5 - 0.991 x6 - 0.148 x8 + 1.10 x9 + 0.025 x10 + 0.085 x11 - 1.13 x12 + 0.025 x13 - 0.0379 x14 + 0.064 x15 + 0.0114 x16 - 0.106 x17 + 0.054 x18 + 0.368 x19 + 0.280 x21 + 0.119 x23 - 0.196 x24 - 0.039 x25 + 0.249 x26	65.6%	37.6%	0.2878
Y5	X1-X26	y5 = 1.69 - 1.26 x2 - 0.43 x3 + 0.27 x4 - 0.425 x5 + 0.38 x6 - 0.039 x8 + 0.46 x9 + 0.108 x10 + .196 x11 - 0.09 x12 - 0.248 x13- 0.182 x14 - 0.090 x15 - 0.235 x16 - 0.407 x17 - 0.216 x18 - 0.521 x19 + 0.348 x21 + 0.739 x23 - 0.796 x24 + 0.004 x25 + 0.41 x26	32.0%	0.0%	0.9257
Y6	X1-X26	y6 = - 1.21 + 0.37 x2 - 0.654 x3 - 0.875 x4 + 0.297 x5 + 1.58 x6 + 0.258 x8 - 0.103 x9 + 0.274 x10 - 0.032 x11 + 0.908 x12 - 0.370 x13 + 0.028 x14 + 0.417 x15 + 0.074 x16 + 0.303 x17 - 0.179 x18+ 0.594 x19 + 1.16 x21 - 0.241 x23 + 0.322 x24 - 0.394 x25 - 0.415 x26	50.9%	11.0%	0.6055
Y7	X1-X26	y7 = 0.720 - 0.107 x2 - 0.039 x3 + 0.189 x4 + 0.714 x5 - 0.624 x6 - 0.104 x8 - 0.040 x9 + 0.057 x10 + 0.128 x11 - 0.628 x12 + 0.012 x13 - 0.102 x14 + 0.314 x15 - 0.032 x16 - 0.266 x17 + 0.419 x18 + 0.931 x19 + 0.037 x21 + 0.125 x23 - 0.349 x24 - 0.342 x25 + 0.690 x26	60.5%	28.4%	0.4312
Y8	X1-X26	y8 = - 0.594 - 0.019 x2 - 0.562 x3 - 0.139 x4 + 0.616 x5 + 0.108 x6 - 0.063 x8 - 0.052 x9 - 0.044 x10 + 0.150 x11 + 0.768 x12 - 0.117 x13 + 0.083 x14 - 0.086 x15 - 0.039 x16 + 0.348 x17 - 0.143 x18 + 1.49 x19 + 0.861 x21 - 0.172 x23 + 0.223 x24 + 0.028 x25 – 0.534 x26	62.8%	32.5%	0.5558
Y9	X1-X26	y9 = - 0.188 - 0.550 x2 - 0.405 x3 + 0.905 x4 - 0.090 x5 + 0.203 x6 - 0.306 x8 + 1.03 x9 + 0.316 x10 + 0.050 x11 + 0.573 x12 - 0.016 x13 - 0.040 x14 + 0.269 x15 + 0.058 x16 + 0.205 x17 + 0.594 x18 + 0.763 x19 - 0.194 x21 + 0.049 x23 - 0.085 x24 - 0.215 x25 + 0.366 x26	51.6%	12.1%	0.5542
Y10	X1-X26	y10 = - 0.81 + 0.02 x2 – 0.206 x3 - 0.167 x4 + 0.366 x5 + 0.264 x6 - 0.109 x8 + 0.249 x9 + .344 x10 + 0.137 x11 + 1.42 x12 + 0.103 x13 - 0.267 x14 - 0.024 x15 - 0.022 x16 + 0.526 x17 - 0.071 x18 + 0.093 x19 - 0.214 x21 - 0.009 x23 + 0.198 x24 - 0.168 x25 + 1.49 x26	61.3%	29.7%	0.5890
Y11	X1-X26	Y11 = 2.56 - 0.006 x2 - 1.02 x3 - 0.025 x4 + 0.128 x5 - 0.311 x6 - 0.282 x8+ 1.36 x9 - 0.042 x10 - .050 x11 - 1.21 x12 + 0.042 x13 + 0.042 x14 + 0.125 x15 - 0.060 x16 - 0.122 x17 + 0.025 x18 + 0.161 x19 - 0.162 x21 + 0.171 x23 - 0.219 x24 - 0.218 x25 + 0.309 x26	28.2%	0.0%	0.4815
Y12	X1-X26	Y12 = 1.56 - 0.016 x2 - 0.602 x3 - 0.231 x4 + 0.727 x5 - 0.578 x6 + 0.262 x8 + 0.345 x9 +0.082 x10 - 0.101 x11 - 0.150 x12 - 0.252 x13 - 0.0283 x14 - 0.000 x15 - 0.0160 x16 + 0.334 x17 - 0.104 x18- 0.344 x19 + 0.253 x21 - 0.117 x23 + 0.062 x24 + 0.108 x25- 0.690 x26	51.5%	12.0%	0.3282

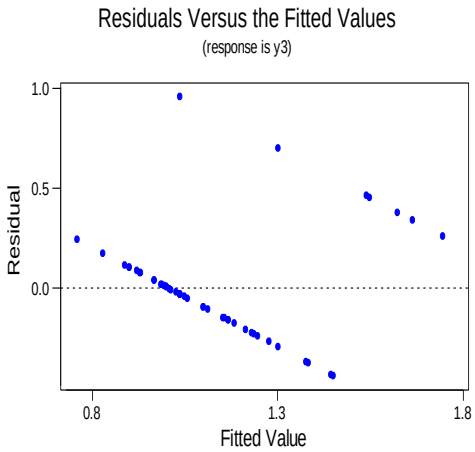
For regression through the origin (no-intercept model),R square measures the proportion of the variability in the dependent variable about the origin explained by regression. This can not be compared to R square for models which include an intercept. X1-X26=independent variables. y 1- y12= dependent variables.



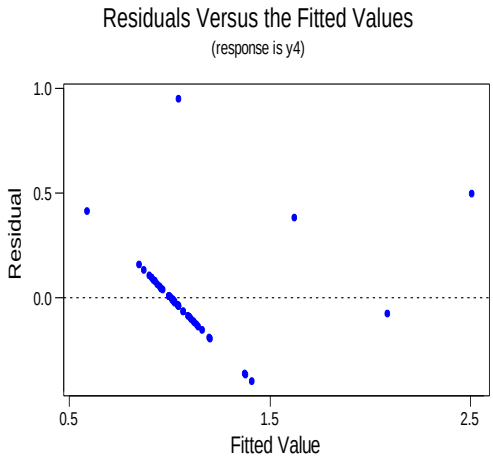
Right 1st Molar occlusion



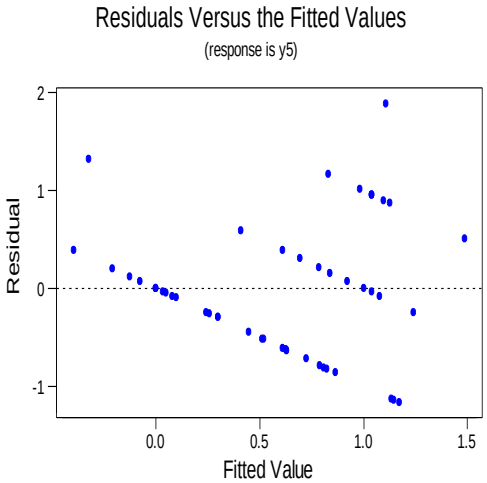
Left 1st Molar occlusion



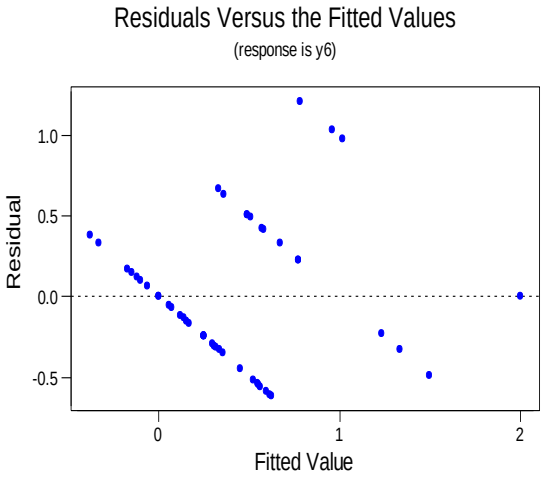
Right Canine occlusion



Left Canine occlusion



Crowding



Cross bite

Cont.

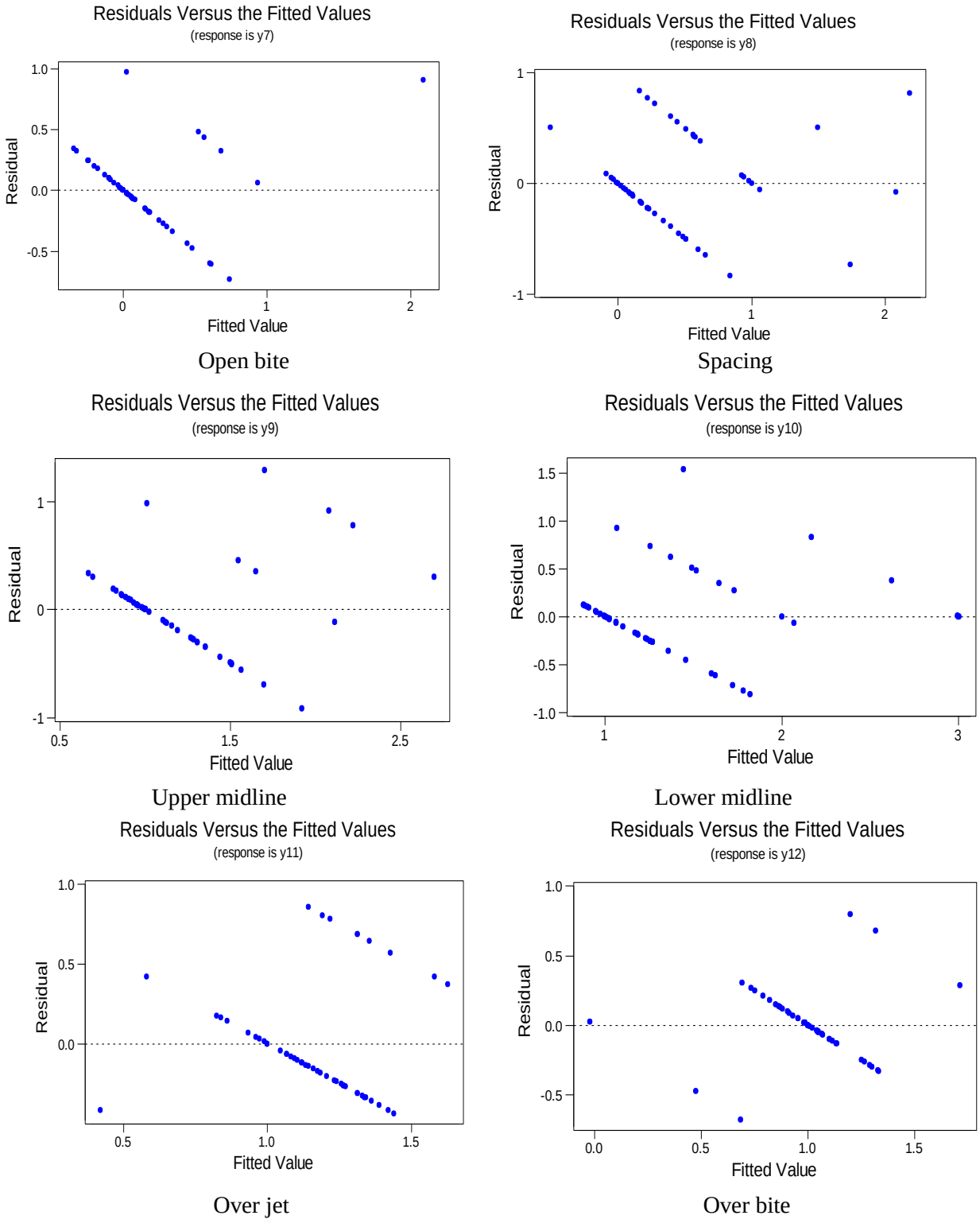


Figure (2): Histograms Representing Regression Equation for the Studied Variables.

RESULTS

As shown in Table (1), Multiple linear regression analysis for independent and dependent variables is done for estimation of variables, and the Regression equation for each dependent variable showing different effects or participations of the independent variables upon the studied dependent one. The effects of the independent

variables vary in negative or positive way, or even may have zero effect depend on the studied dependent variable.

R square measures the proportion of the variability in the dependent variable about the origin explained by regression. The least variability is in y1(right 1st molar occlusion),where as the highest one in y4(left canine occlusion),{R-Sq for y1=0.0%, y2=57.8%, y3=41.1%, y4=65 .6%, y5=32. 0%, y6 = 50.9%, y7= 60.5% , y8=62.8%,y9=51.6%,y19=61.3%, y11=28.2% and y12=51.5%}.

DISCUSSION

The newly designed diagnostic digital chart for orthodontic patients in this study is more collective in information used in comparison to the available orthodontic examination sheet in POP Department in College of Dentistry/Mosul University, also in relation to other studies which focused on certain factors and ignored others[9-15],(Table 2).

Table (2): Comparison of diagnostic information of the present study in relation to other studies.

Present study 2009/Mosul University	**Sarver 1998[9]**	**Graber 2000[10]**	**Bishara 2001[11]**	**Profitt 2003[12]**	**Royal College of Dentists of Canada[13]**	**Damascus University[14]**	**Ajman University[15]**
◆Personal Information	✓	✓	✓	✓	✓	✓	✓
■Date of starting treatment	✓	✓	✓		✓	✓	✓
■Date of finishing treatment	✓	✓				✓	
◆Chief Complaint	✓	✓	✓	✓		✓	✓
◆Medical History ■Long term medication		✓	✓		✓	✓	✓
■Systematic disease or metabolic problem		✓	✓			✓	✓
■Allergies)							
◆Dental History ■Trauma to teeth		✓	✓	✓	✓	✓	✓
■Trauma to jaw			✓				✓
■Habits			✓			✓	✓
■Did mother or father have an orthodontic problem? Treated?		✓				✓	
■Did patient receive previous orthodontic treatment?			✓				✓
■Does patient have regular dental treatment?		✓					
◆Orthodontic Examination: *A-Extra-oral examination* I-Frontal view ■Shape of face	✓	✓	✓	✓	✓	✓	✓
■Face symmetry:	✓	✓	✓	✓	✓	✓	✓
II-Lateral view ■Facial profile:	✓	✓	✓	✓	✓	✓	✓
■Facial height:			✓		✓		✓
III-Lips' relationship ■ Lips' competence	✓	✓	✓		✓	✓	✓
■Upper lip length	✓	✓			✓		

Cont.

■Breathing			✓			✓	✓
■Functional shifts of mandible on closure			✓			✓	✓
B-Intra-oral examination:					✓		
I-Occlusion ■Molar relation (Angle's classification)	✓	✓	✓	✓	✓	✓	✓
■.Canine relation	✓	✓	✓	✓	✓		✓
■.Incisor relation	✓	✓		✓	✓		
■Overjet	✓	✓	✓	✓	✓	✓	✓
■Overbite	✓	✓	✓	✓	✓	✓	✓
■Dental midline	✓	✓	✓		✓	✓	✓
■.Missing teeth	✓	✓	✓		✓	✓	✓
■Extracted teeth	✓	✓			✓	✓	✓
■Impacted teeth	✓	✓	✓		✓	✓	✓
■Supernumerary teeth number	✓	✓	✓		✓	✓	✓
■Abnormal teeth size number	✓	✓	✓		✓	✓	✓
■Abnormal teeth shape number	✓	✓	✓		✓	✓	✓
■Crowding	✓	✓	✓		✓	✓	✓
■.Spacing	✓	✓	✓		✓	✓	✓
■.Cross bite	✓	✓	✓		✓	✓	✓
■.Open bite	✓	✓	✓	✓	✓	✓	✓
■.Stage of dental development			✓			✓	✓
■Labial frenum						✓	
■Tongue size						✓	
■Lingual frenum						✓	
II-Periodontal condition	✓	✓	✓	✓		✓	✓
III-Oral hygiene		✓		✓			✓
IV-Tempromandibular joint problem	✓	✓	✓	✓		✓	✓
◆Dental Casts							
Mandibular dental cast I-Cast symmetry						✓	
II-Space analysis			✓			✓	✓
A)For Mixed Dentition(Hays-Nance Analysis)	✓	✓		✓		✓	✓
B)Permanent Teeth (Total Mandibular Dentition Space Analysis)							
III-Arch form	✓	✓					
Maxillary dental cast I-Cast Symmetry						✓	
II-Space analysis			✓			✓	✓
A)For Mixed Dentition(Hays-Nance Analysis)	✓	✓		✓		✓	✓
B)For Permanent Teeth(Total Dentition Space Analysis)							
III-Arch form	✓	✓					
◆ BOLTON Tooth Size Discrepancy Analysis						✓	✓

Cont.

◆Photographs 1.Extra-oral *A.Frontal:(in natural head position)*		✓		✓		✓	
I-At rest							
II- Teeth in maximal intercuspation with lips closed							
III-Frontal dynamic smile							
IV- A close-up image of the posed smile							
V-A three quarters view 45 degree photograph							
B-Lateral (in natural head position)						✓	
2.Intra-oral							
I-Right lateral							
II-Left lateral							
III- Anterior							
IV- Upper occlusal							
V-Lower occlusal							
◆Radiographic Interpretation: I-Lateral Cephalometric Radiograph Analysis	✓	✓	✓	✓	✓	✓	✓
II-Panoramic Radiograph Analysis	✓	✓	✓	✓		✓	✓
III-Other Radiographs	✓	✓		✓		✓	
◆Orthodontic Problem List			✓		✓	✓	✓
◆Treatment Objectives(in response to problem list)			✓			✓	✓
◆Treatment Plan	✓	✓	✓	✓	✓	✓	✓
◆Treatment Options (orthodontic appliances)		✓	✓		✓	✓	✓
◆Prognosis of Case						✓	
◆Retention	✓	✓	✓	✓	✓		✓
◆Cost of treatment							
◆Supervisor's name and signature	✓	✓	✓	✓		✓	✓

The result, in Table (1) showed that, each dependent variable (which is taken from fifty randomly selected orthodontic patients' files) is explained by different percentage of participations or effects of independent variables. In other words, the information and data given in the available case sheets in the orthodontic department in the College of Dentistry are not enough to explain the studied dependent variables; therefore the suggested newly diagnostic orthodontic digital case sheet may satisfy these requirements.

Each patient's unique chart number

provides the common key to the various computer records, which contain the following data:

1) Personal data, such as name, address…etc.

2)Diagnostic data such as openbite, crossbite, overjet, … etc.

3)Treatment data such as previous orthodontic treatment, previous extraction, … etc.

4) Dental cast analysis data.

5)Initial cephalometric data, such as S-N-A, S-N-B, … etc.

6) Photographs.

7)Prognosis of case and post-treatment data.

One of the important features of the present new digital chart is the availability of photographic and radiographic diagnostic digital pictures' files that are connected to the chart and can be easily viewed and examined. Another important point is the availability of additional data file connected to the chart that offers the cephalometric norms (skeletal and soft tissue) for Iraqis lives in Mosul city, both adolescents and adults which is derived from the available studies in the Mosul College of Dentistry.[16-21] These agree with many studies which suggested that the orthodontist must develop a sound treatment plan based on the clinical and additional radiographic and photographic evidence. [10-12]

In addition many advantages are obtained from this newly designed paperless digital chart over the old written case sheet file which is in agreement with other studies, including:

- The use of computers and data-basing programs permit searching information quickly and efficiently.[9]
- It gives us the capability to be thorough and consistent in our clinical evaluations and the ability to access this data easily to make treatment decisions. [9]
- It allowed us to merge the clinical exam and the other documentation of the treatment-planning process. [9]
- Data can be added, deleted, or changed and saved. [22]
- New records can be added for new patients, or deleted completely for certain patients. [22]
- Permit the user to define files, enter data into those files, sort them, and create reports from them. [23]
- Being able to filter data to extract specific information only. [6]
- This computer program can be used for teaching purposes. [22]
- This program can be used as a data base from which further new researches can be obtained and statistically analyzed. [22]
- Facilitate efficient data retrieval and make a large database available for faculty and student research. [23]
- Ease of storage and retrieval. [24]
- Ease of interoffice transferability. [24]
- Capability to assist the clinical and auxiliary staff to streamline the initial function of patient examination and data gathering. [9]
- And reducing the amount of work required either by the doctor or staff to produce documentation of the clinical exam and treatment. [9]

CONCLUSIONS

New digital orthodontic examination and diagnosis chart was prepared. The creation of a digital chart that combines the use of information technology with a consistent analysis to aid orthodontic diagnosis will be a relevant contribution to the improvement of orthodontic care in POP department in College of Dentistry/Mosul University. It increases the safety of the patient and proposes an optimization of treatment planning. It also provides support in the field of teaching and research, enhancing the capacity to control a great number of variables in clinical studies.

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