



Comparative panoramic study of the elongated styloid process between male and female , their possible associations with age and Eagle's syndrome symptoms in Iraqi dentulous subjects

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Abstract

Background : The stylohyoid process is a cylindrical bony structure surrounded by important anatomical structures including vessels and nerves. Calcification and elongation of the stylohyoid ligament complex over 30 mm may be associated with neck and facial pain, known as Eagle's syndrome . The aims of the study were to compare the elongated styloid process between male and female , their possible relations with age and Eagle's syndrome symptoms in Iraqi dentulous population using panoramic radiographs .

Materials and methods_: Clinical and radiographical records of 70 patients (40 female and 30 male). The length of the styloid processes were assessed using panoramic radiographs . Measurements of the length of the styloid processes were made directly from its insertion site to the petrous part of the temporal bone to its tip.

Results : There was highly statistically significant difference between male and female for right side and left side of the styloid process length p-value <0.01. Chi-square between present of symptoms and styloid process length of age showed statistically non-significant difference.

Conclusion : Panoramic radiography is useful tool for detection of an elongated styloid process in patients with or without symptoms and can thus help avoid misinterpretation of the symptoms.

Keywords : Panoramic , styloid , Eagle's syndrome , elongated .

Introduction

The styloid process (SP) , which arises embryonically from the Reichert cartilage of the second branchial arch, is a long and thin outgrowth at the base of the temporal bone , immediately in front of the stylomastoid foramen, posterior to the mastoid apex. It serves as a point of attachment for the stylomandibular ligament as well as the styloglossus , stylohyoid , and stylopharyngeus muscles. Elongation

of it is a poorly understood process, commonly admitted theories about the actual cause of the elongation of the styloid process (SP) are defined as congenital elongation of the (SP) , calcification of the stylohyoid ligament by an unknown process, and growth of osseous tissue where the stylohyoid ligament inserts ^{1,2} . The regional factors like dietary factors are also important for different patterns and

types of styloid process elongation³. Panoramic radiograph is a routine exam in the dental and oral medicine practices, its great advantage is to allow practitioners to analyze components of the stomatognathic system in addition to other near structures⁴. Elongated styloid process (SP) gives a complex of symptoms described by Eagle in 1937, hence the condition is also known as Eagle's syndrome; symptoms are secondary to calcification of the stylohyoid ligament or to an elongated SP^{2,5}. Normal length of styloid process was stated by Eagle as 2.5 cm⁶. There are authors that take normal values up to 3 cm for the SP length^{7,8,9}. Eagle's syndrome can occur unilaterally or bilaterally and frequently results in symptoms of dysphagia, recurrent throat pain and foreign object sensation, referred otalgia, headache, pain on rotation of the neck, dizziness, pain on extension of the tongue, pain on opening mouth, discomfort during chewing, change in voice, and a sensation of hyper salivation¹⁰. The symptoms can be confused with some other disorders including a wide variety of facial neuralgias, unerupted molars, temporomandibular joint disorders, tumor in the oropharynx and hypopharynx and irritation from the dental prosthesis these can be ruled out thorough clinical and radiological examination¹¹. In addition to careful clinical examination, the use of plain radiographs, orthopantomograms, or computed tomography (CT) scan allows accurate preoperative diagnosis of this syndrome. Surgical treatment positively resolves the symptoms¹². The aims of the study were to compare the elongated styloid process between male and female, their possible relations with age and Eagle's syndrome symptoms in Iraqi dentulous population using panoramic radiographs.

Materials and methods

Seventy dentulous patients (40 female, age ranged from 22 to 50 years; 30 male, age ranged from 18 to 70 years), all subjects were examined clinically and scanned using a panoramic machine (My ray CE 0051(V.B1 cocc A 14/C-IMOLA (BO)-Italy, X-ray source (85 kVp, 10 mA), exposure time(18 sec). The information's and history for all patients were recorded in special case sheets. The length of each SP was measured by using measuring tools from its insertion site to the petrous part of the temporal bone to its tip^{2,13}. The length was recorded separately for each side since there were some differences between right and left sides. The collected data was analyzed using statistical analysis software SPSS version 16, t-test, Pearson's correlation and Chi-square test were used to determine any significant differences between variables.

Results

In table (1) showed the mean of age (34.6 for female, 46.7 for male), SD, SE and number of female and male that present the symptoms. Figure (1) showed the mean of age for both gender.

Table (2) showed that the mean of elongated styloid process length for both right and left sides in male longer than female, figure (2) showed the means of elongated styloid process length for both male and female.

T-test between male and female by age showed statistically significant difference with (p-value = 0.002), there was highly statistically significant difference between male and female for both right side and left side of the elongated styloid process in length (p-value <0.01), table (3) cleared that.

T-test cleared statistically non-significant difference for both age with right side of the elongated styloid process length ; and age with left side of the elongated styloid process length in female. T-test between right and left sides of the elongated styloid process length showed statistically non-significant difference in female.

T-test cleared statistically significant difference for both age with right side of the elongated styloid process length and age with left side of the elongated styloid process length in male with (p-value=0.002 ; p-value=0.003) respectively. T-test between right and left sides of the elongated styloid process length showed statistically non-significant difference in male, table (4) explained these results.

Chi-square between present of symptoms and elongated styloid process length of age showed statistically non-significant difference, table (5) illustrated that.

The present of symptoms increased in older age groups in both female and male , as shown in tables (6) ; (7) . Figure (3) cleared that .

Pearson's correlation showed moderate statistically significant correlation between age and present of symptoms in female , male and total ($r=0.56$, $r=0.48$, $r=0.492$) respectively, table (8) showed that .

Figures (4) , (5) and (6) cleared the value of the age effect on present of symptoms in female , male and total with $\beta = (0.283)$, (0.1541) and (0.165) respectively.

Discussion

It is important to be aware of presence of SP elongation for all health care professionals deal with the diagnosis and treatment of head and neck pain . Eagle's syndrome (elongated styloid process syndrome)

is a rare disease and 1.5–3.0% of adults have some of the complaints due to this pathology¹⁴ . Eagle's syndrome develops due to an elongation or deformation of the styloid process or ossification/calcification of the styloid process^{9,14,15} . The pressure effect of the elongated styloid process may result in contraction of the surrounding soft tissues. It seems that the length is not enough to explain these complaints¹⁶ . Thus, other morphological characteristics of the stylohyoid chain , such as the angle degree, are necessary to explain the causes^{17,18} . In this study found that males had greater lengths of elongated styloid process than females and present of symptoms only in older age which is in agreement with findings of Balcioglu et al. in 2009¹⁹ during a study done using panoramic radiographs and they found that males had greater styloid process lengths than females and the symptomatic subjects were all older than 40 years . The differences in lengths between male and female patients is statistically significant and the observations of the very slow but significant increase of length with age in this study which is in conformity with the conclusions of Jung et al. in 2004²⁰ and MacDonald-Jankowski in 2001²¹ . More and Arsani²² studied 500 digital panoramic radiographs of a population in the Gujarat region of Western India , in 2010 both these investigators favored the theory of ageing for styloid process elongation and had the same results of this study that the length of both styloids increased with age and males had longer styloids than females . The results of this study disagree with Lengele' and Dhem in 1988²³ which found that "age is no factor influencing the length of the process" this difference may be due to the size of sample . Anbiaee and Javadzadeh²⁴ used panoramic radiographs for the measurement of SP length and

indicated that SP length was associated with increasing age. The result of this study agreed with a study done by Roopashri et al.²⁵ revealed that as age increased elongation of styloid process increased using panoramic radiograph of 107 subjects out of 300 patients who were aged between 10 and 70 years old. The findings of a study done by Shaik et al.²⁶ who were observed that there was an increase in the length of the styloid process with an increase in the age, these findings were in consistent with the present study and studies conducted by various authors^{27,28,29}. Clinical and radiographic records of 208 patients were evaluated retrospectively in study done by Öztunç et al. in 2014³⁰, radiological examinations including measurements of the structure, length, and medial angulations of SP were performed on CBCT images and they did not find a relationship between patient age and SP length in overall study population and the average length of SP between male and female patients was not significantly different in elongated group, indicating no relationship between gender and length of SP, the difference about this issue in different studies may be due to the race of the patients, study only patients suffering from orofacial pain, the size of sample and study both elongated and non-elongated styloid process while in this study only elongated and some patients suffering from present of symptoms using panoramic as diagnostic machine for measurement. The assessment of the length of SP might be effected by the magnification of the panoramic devices and by the angulations of the SP in 2D imaging technology. Moreover, symptoms also depend on the angulation of SP as well as length¹³. In this study measured only length without angle and this may be suggestion for further study that these parameters can only be measured by

advanced imaging techniques exactly. When the angle of SP is narrow, it may be supposed to produce some complaints due to compression of adjacent structures. Öztunç et al. in 2014³⁰ and Nayak et al. in 2007³¹, studies revealed that patients with elongated SP had significantly narrow angle. It was also observed that prevalence of subjective symptoms was significantly higher in the patient population with elongated SP. Bagga et al. in 2012³² showed during their study, the higher prevalence of elongated styloid could be attributed to the combination of factors including race, lifestyle, and dietary habits.

Conclusion

Panoramic radiography is useful tool for detection of an elongated styloid process in patients with or without symptoms and can thus help avoid misinterpretation of the symptoms. The assessment of the styloid process may be important factors to be taken into account not only from the viewpoint of styloid syndromes, but also in preoperative planning and during surgery.

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Table (1) : Show the mean of age , SD , SE , and No. of symptoms in female , male and total .

	Mean age	SD	SE	No. of symptoms
Female	34.6	9.161	2.049	12
Male	46.7	16.922	3.785	12
Total	39.78	14.288	1.709	24

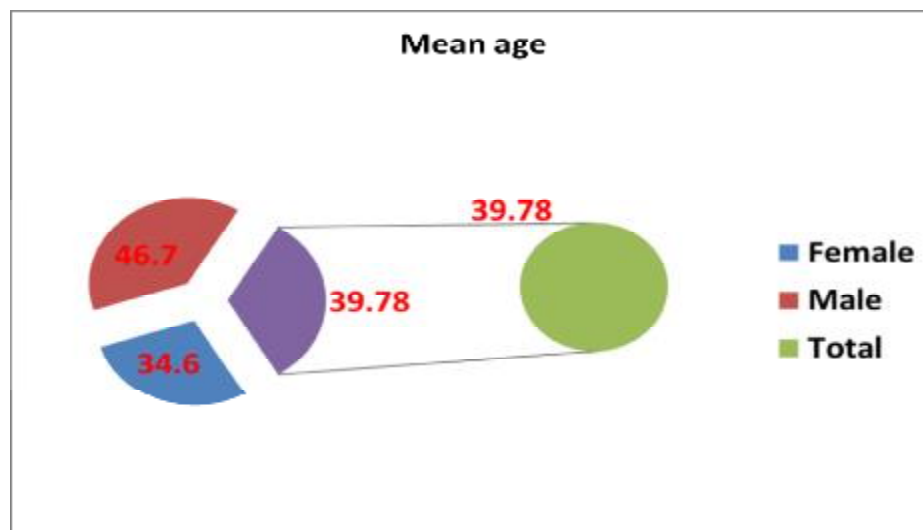


Figure (1) : 3-D Pie chart showed the mean age of female and male

Table (2): Descriptive of elongated styloid process length in both female and male

	Female		Male	
	Right length	Left length	Right length	Left length
Mean	33.31	33.13	35.48	35.26
SD	1.71057	1.971099	1.491216	1.764125
SE	0.382678	0.440962	0.333605	0.394659

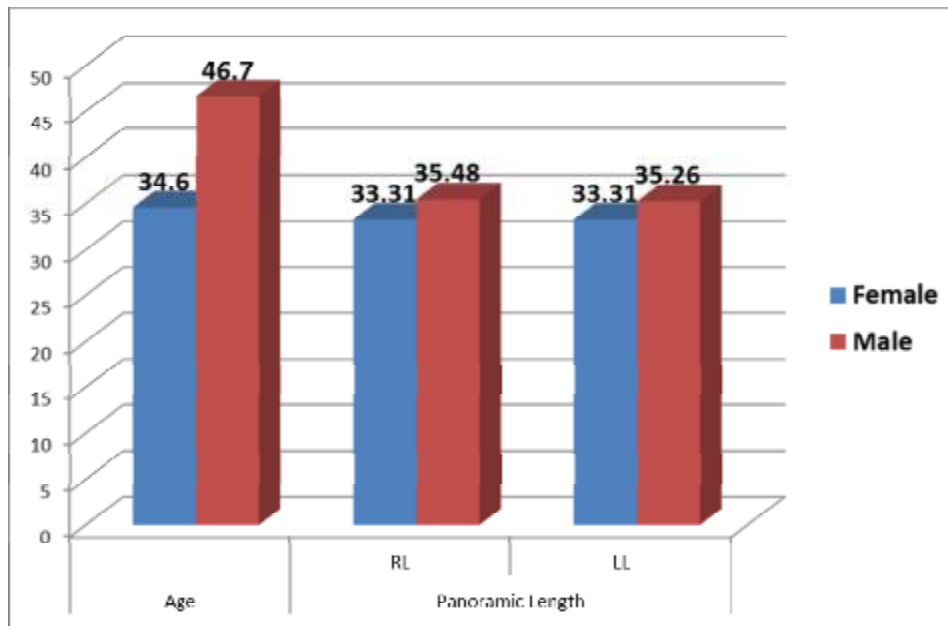


Figure (2) : The mean age of elongated styloid process length in female and male .

Table (3): T-test between male and female for age , length of right and left sides of elongated styloid process .

between male & female	T	p	Sig
age	3.761	0.002	S
Right length	6.475	P<0.01	HS
Left length	5.382	P<0.01	HS

Table (4) : T-test for age and length of right side, age and length of left side and between length of right and left sides of elongated styloid process in each gender.

	Female			Male		
	T	p	Sig	t	p	Sig
Age & Right length	0.969	0.339	NS	3.684	0.002	S
Age & Left length	1.114	0.272	NS	3.803	0.003	S
Right & Left length	1.364	0.181	NS	1.913	0.066	NS

Table (5) : Chi-square for present of symptoms

Symptoms	Chi	p	
	0.761	0.383	NS

Non - significant because they present in only old age .

Table (6) : Descriptive of symptoms by age groups in female and male .

	Female	Symptoms	Male	Symptoms
<20	0	0	3	0
20-30	20	4	3	0
31-40	8	0	3	0
41-50	12	8	6	2
>50	0	0	15	10
Total	40	12	30	12

Table (7) : Distribution of symptoms by age groups .

	No.	%	S.y	%
<20	3	4.28571	0	0
20-30	23	32.8571	4	16.6667
31-40	11	15.7143	0	0
41-50	18	25.7143	10	41.6667
>50	15	21.4286	10	41.6667
Total	70	100	24	100

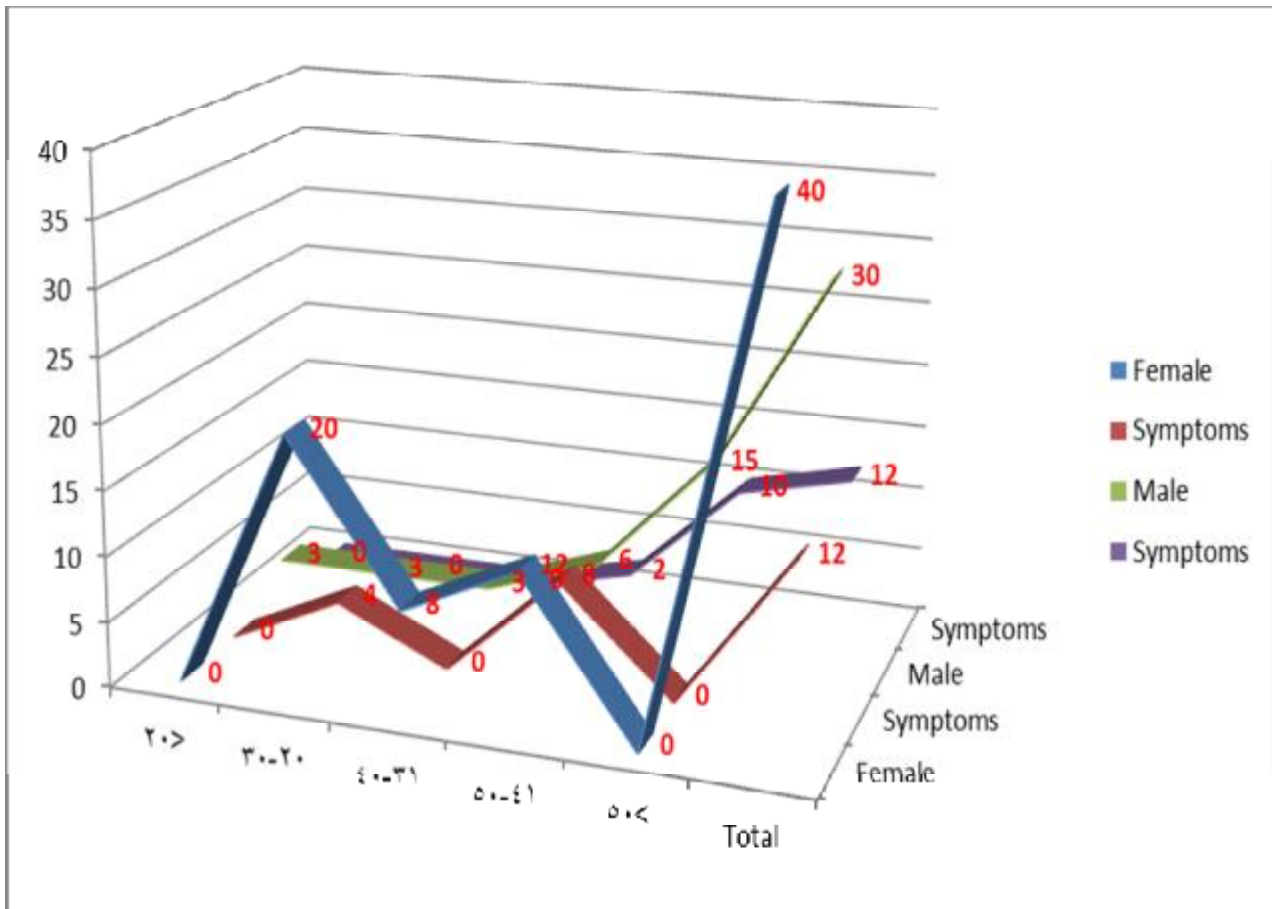


Figure (3) : Distribution of symptoms by age groups in female and male .

Table (8) : person's correlation between age and present of symptoms in female , male and for total .

		r	p
Female	Age & Symptoms	0.56	P<0.01
Male	Age & Symptoms	0.489	0.007
Total	Age & Symptoms	0.492	P<0.01

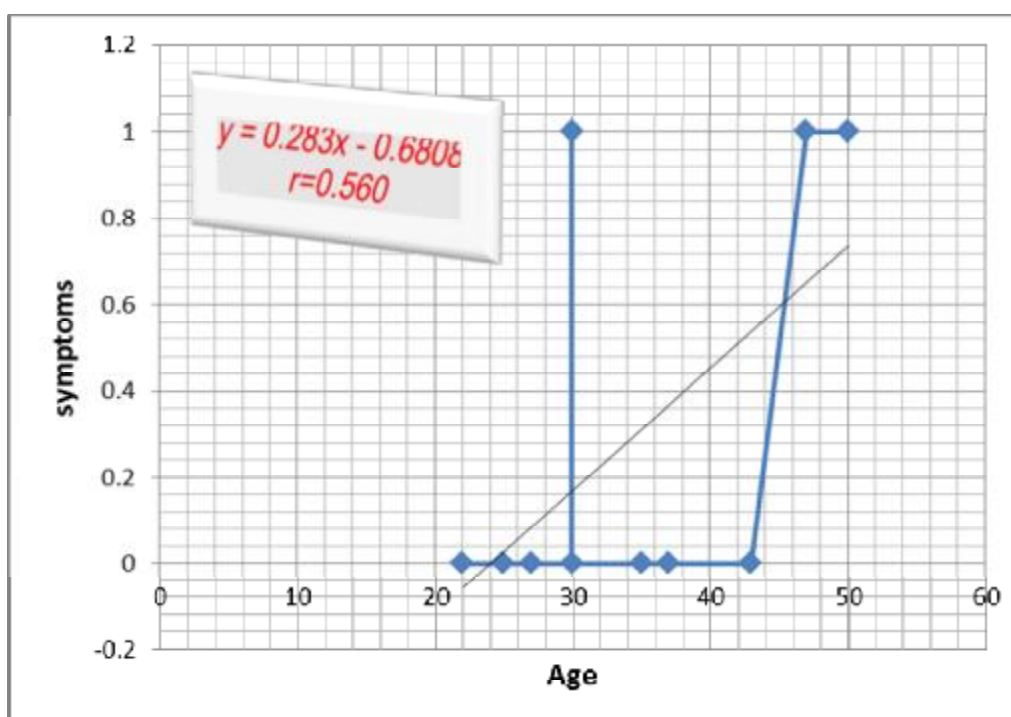


Figure (4) : Show person's correlation $r=0.560$ between age with symptoms in female ; the effect of age with symptoms $b=0.283$

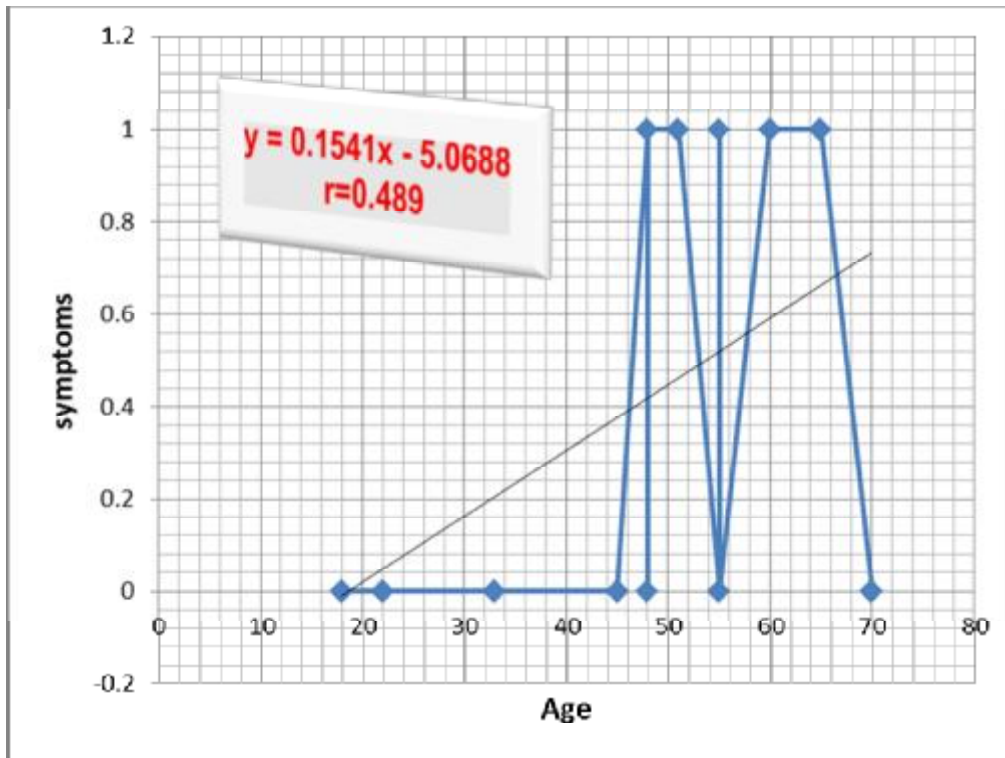


Figure (5) : Show person's correlation $r=0.489$ between age with symptoms in male ; the effect of age with symptoms ($b=0.154$) .

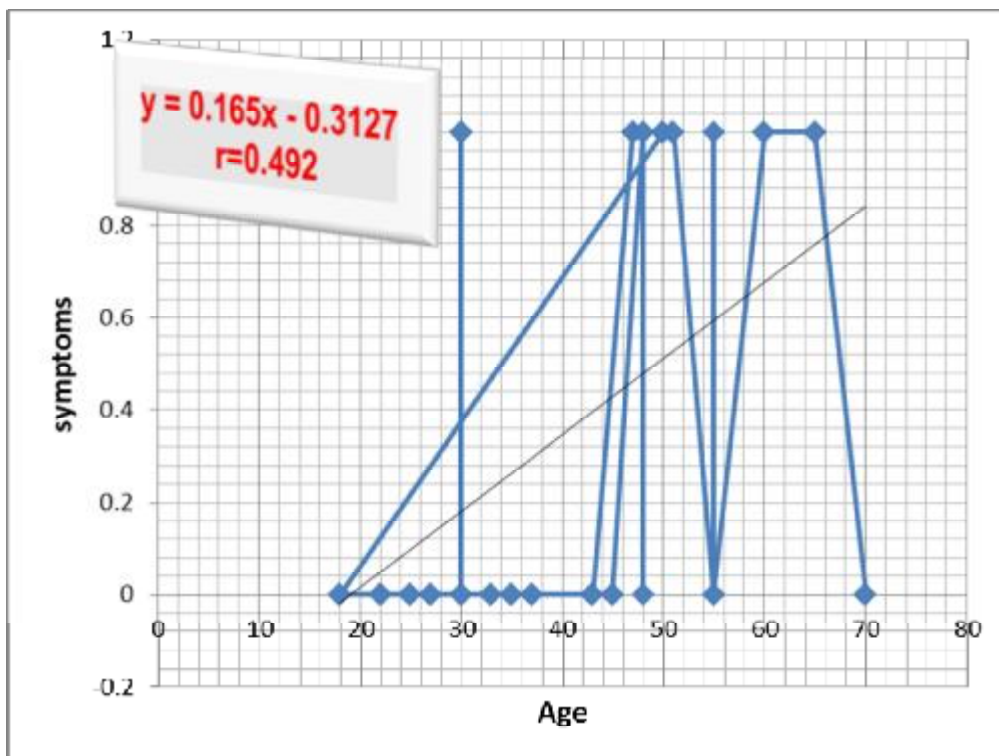


Figure (6) : Show person's correlation $r=0.492$ between age with symptoms ; the effect of age with symptoms ($b=0.165$) .