Evaluation of the Cognitive Level of the Students of Administration and Economics Collage / Mustansiriyah University on the Risks of Tattoos by using the Discriminant Analysis

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Abstract:

The trend of tattooing in different areas of the body has recently spread in a noticeable manner in Arab societies in general, and among young Iraqis in particular, and it becomes an obsession that is increasingly popular for both sexes as a sign of freedom and keeping pace with fashion.

There are many reasons for Iraqi youth to tattoo their bodies. These reasons were presented to a sample of the students of the Collage of Administration and Economics / University of Mustansiriyah. A questionnaire was distributed to 400 students from the departments of the Collage of Administration and Economics of all phases of study through a questionnaire to classify and discrimination the main reasons lead to tattoo working, by using the discriminant analysis.

The following results have been reached, and showed that the variables (x_3 , the existence of mental disorders and behavioral deviations) in the first discriminant function, and ($x_5$to draw attention to the location of the tattoo and highlight the strength and rigidity) in the second discriminant function, and the two variables (x_7 to express an indication in the psychological aspect of the person who makes a tattoo), and (x_{11} a try to having a more beautiful body or a more pompous image of the arm and body drawn to refer to a person who has been killed or bombed), and In the third discriminant function they had a high effect, they contributed positively to the causes of the phenomenon of tattoos ,while the variables x_6 in the in the first and second discriminant functions, and x_3 in the third discriminant function have significant negative contribution to discrimination, as well as that the level of knowledge of the students of the first and second study phases about the tattoo health risk has been evaluated , which was weak for them, while it was average for the students of the third phase, and good for those of the fourth phase.

Key Word: Discriminant analysis, Risk of tattoo, Cognitive level, Classification, Questionnaire, Discriminant function.

1-Introduction:

The habits have turned out to be an infection transmitted through the ether from Western societies to the Arab youth, and among these habits is what is called tattoos, which has been transmitted through television to the Arab world. It has become a phenomenon that has been rushed for by young men and women, who started to tattoo their bodies with colorful shapes and drawings.

Women once outlined their faces with tattoos in an expression of beauty of women and tribe to which they belong, but this custom has extincted and disappeared after the discovery of its disadvantages. But it returned today in a western style,it does not carry any content other than the blind imitation of other societies and drifting behind their culture only.

What is known by the Arabic name (Washim) tattooing is the implantation of the needle to the body until the blood leaks and then draws their place with inks and colored materials to give the form required to draw, and there is no specific place in the body to draw the tattoo on it. In the past, most popular place has been evaluated on the shoulder or forearm from the inside, but now it may be on the neck, back, chest, abdomen, or other places for both genders. despite the widespread of this phenomenon, and the work of art in the selection of drawings and extending them on big spaces of the body, and it remains unbelievable that there is a tattoo on the eye that required the injection of the eye 40 times with a colored dye mixed with anti-inflammatory material, in addition to that there is the presence of tattoos in pure gold which becomes the latest in the world of cosmetics and accessories.

The data were collected by means of a questionnaire consisting of two axes with a number of questions. The first topic is about the dangers of tattooing on health, and the second axis on the causes of its widespread among Iraqi youth and health awareness about it. The questionnaire was distributed to four departments of the Collage of Administration and Economics / Mustansiriyah University during the first semester of 2014-2015 and for all grades, and the sample size was 400 students. The causes of its spread were identified through 13 questions tested by the **Likert five Scale**, Each question allowed only one correct answer.

The level of knowledge of students about the risk of tattoos was classified through 10 questions represented by the risks caused by tattoo work on the health through calculating the rates which are low, medium and high level of knowledge of students and classified the knowledge of students

accordingly, as considered 10-29% weak, 30-49% average, 50-69% was considered high and the ratio of 70% and more, was very high.

2- Research Objective

The objective of this paper is to assess the level of knowledge of the students of the Collage of Administration and Economics about the risk of tattoos on the general health, in addition to classify and distinguish the causes leading to its spread among young people, through the view of the students of the Collage of Management and Economics using the discriminant analysis of the student's answers.

3- Theoretical side

3-1 Discriminate Analysis

It is one of the statistical methods of multivariate analysis is the discriminant analysis (DA). The discriminant analysis is used in the study of classification of persons or signs into groups that were two or more groups based on the pairs, ratios or grades obtained in the linear synthesis of the independent variables, as if customers were categorized into customers who were expected to be satisfied or dissatisfied with a particular product or to classify companies to companies that were expected to default or not expected to default. **[3]**

It shows that DA studies the causal relationships between variables and it is used as an exploratory means to understand causal relationships sufficiently, as it deals with the issue of differentiation between two or more groups which are similar in many characteristics on the basis of several variables through the use of the discriminant function which is a linear installation of independent variables.

The classification process is the subsequent process after the formation of the discriminant function since it will be a dependence on this function in the prediction and classification of the new class of one of the groups under study with the least possible classification error. The equivalence of the variations of the groups is required, and there is a linear distinction in the case of two groups, and a linear distinction in the case of more than two groups, while non-linear discrimination is used in the case of inequality (variations) **[5].**

3-2Testing the significance of the discriminant function

When the distinction between two groups is to be tested, the following hypothesis can be tested:

$H_0 : M_1 = M_2$

$H_1 : M_1 \neq M_2$

The test statistic used in the case of the distinction between two groups, T^2 (Hoteling) and its formula as follows **[9]**

$T^2=\frac{n_1 n_2}{n_1+n_2} D^2$ … (1)

Where D^2 represents **(Mahalanobis Distance)** and its formula is as follows

$$D^2 = (\bar{x}_1 - \bar{x}_2)\acute{S}^{-1}(\bar{x}_1 - \bar{x}_2) \quad ...(2)$$

Whereas:

$\bar{X}_1$, $\bar{X}_2$ are arithmetic means

S represents the variance

The (F) test is used, and its formula is as follows:

$$F = \frac{n_1 + n_2 - p - 1}{(n_1 + n_2 - 2)p} T_2 \quad ...(3)$$

With the degree of freedom (P, n_1+n_2-p-1), we reject H_o at a significant level Fα if:

$F_{cal} > F_{\alpha}$, (P, n_1+n_2-p-1)

We accept H_1 and this indicates that the mean of the groups is not equal and that there are significant differences between the two groups. This means that the linear discriminant function is highly distinguishable; the Wilks-Criteria can also be used according to the following equation. **[9]**

$$\Lambda = \frac{|W|}{|T|} \quad ...(4)$$

T: Matrix of variance and total heterogeneity of groups.

W: Matrix of variance and heterogeneity within groups.

The value of Λ is between zero and one. If it is close to or equal to one, it indicates that the mean of the groups is equal, so there is no discrimination between the groups, while when its value is close to zero, this indicates the power of discrimination.

The scale (c2) can also be used, this scale is more accurate than (Λ) scale and its formula is as follow:

$c2 = -\text{Log}(\Lambda)$ ...(5)

With a freedom degree of P (K-1), where P is the number of variables, and K is the number of groups.

3-3 Probability of classification error

There are two types of Probability error rating, and they are:

1- The probability of the P_{12} classification error is the possibility of classifying the individual into the second group, while it originally belongs to the first group.

2- The probability of the P_{21} classification error and the probability of classifying the individual into the first group, while it originally belongs to the second group, and thus the rating probability will be as follows **[6]**

$P_{21} = \Phi\left(-D/2\right)$ … (6) P_{12}=

Where Φ represents the normal distribution function

D: is the root of the **Mahalanobis** scale D^2.

4- The application side

The data were collected by means of a pre-designed questionnaire distributed to 400 students in four departments at the Collage of Administration and Economics, University of Mustansiriyah. Morning studies only for the academic year 2014-2015. Each department included 100 questionnaires with 25 questionnaires per study stage distributed randomly to males and females. The retrieved of which was (325) Questionnaires, (94) of them are of the first phase, and (79) of the second phase, and (71) of the third phase, and (81) of the questionnaire of the fourth phase, which contains two axes:

4-1 Axis one (Tattoo Health Risks)

The tattoo has risks that are limited to the possibility of skin cancer, psoriasis, allergies in some cases and acute inflammation due to poisoning, especially when using dye of other purposes such as car paint or writing ink, and poor sterilization, which leads to transmission of diseases of hepatitis and HIV and syphilis. This axis included students introduction to the dangers of tattoos making on the health of Iraqi youth in the present time.

The students' level of knowledge about the dangers of tattooing was determined by a questionnaire consisting of 10 questions about risks. Each question allowed one answer which is (they have knowledge of tattoos risks/ yes) or (they have no knowledge of tattoo risks/ no). by calculating the sum of answers, the level of knowledge is evaluated as (weak, medium, high and

very high) for students, and then classified the knowledge of students accordingly, as the proportion of 10-29% is considered weak, while the proportion of 30-49% medium, and 50-69% high, and the ratio of 70 and more very high, as shown in the following table:-

Table (1): Distribution of students by level of knowledge and stage of study

Knowledge level / Study phase	Having knowledge of tattoo risks on health	Per 100 ratio	Evaluation of knowledge level	Do not have knowledge of tattoo risks on health	Per 100 ratio	Evaluating of the knowledge level	Total
Phase 1	14	14.8%	Weak	80	85.1%	Very high	94
Phase 2	20	25.3%	Weak	59	74.6%	Very high	79
Phase 3	29	40.8%	Medium	42	59.1%	High	71
Phase 4	50	61.7%	High	31	38.2%	Medium	81
Total	113			212			325

From the above table, we notice that the students, who knew about the tattoos risk on health, were few. Their level of knowledge was weak for the first and second study phases. In the third stage, their level of knowledge was average while the level of knowledge for the fourth stage was high compared to the other stages.

4-2 The second axis of the questionnaire (the causes of the spread of tattoos among Iraqi youth)

It included a number of questions about the causes of the spread of tattoos among Iraqi youth and the health awareness of them. This axis was tested by using the discriminant analysis (DA) through 13 questions according to Likert five-point scale. Each question allowed only one correct answer, through which the causes of its spread has been classified and discriminant.

4-2-1 Analysis of the results of the second axis of the questionnaire using the discriminant analysis

The composition of the linear discrimination function was based on several variables, namely, the causes of the widespread of tattoos among young people, and each variable was gathered from (four sections of the Collage of Administration and Economics), and included:

A - The dependent variable in the differential analysis is a nominal variable, which is a qualitative variable, whereas the dependent variable in

the regression analysis is usually a continuous variable, which is a quantitative variable, which represents the stages of study (Phase one, , two, three, four). **[4]**

B- the independent variables represented by the causes of the widespread of tattoo phenomena which are(x_1 try to fill the vacuum in individuals), (x_2 the absence of the right awareness of the risks of tattoo),, (x_3 the existence of mental disorders and behavioral deviations), (x_4 to express the unhappiness and indignation of a certain circumstance or witness), (x_5 to draw attention to where the tattoos are and highlight the strength and rigidity), (x_6 to express force if the tattoo holds certain meanings), (x_7 to express some psychological indicator in the psychology of the person who is tattooing), (x_8 a try to imitate stars and celebrities), (x_9 to indicate somebody who have been killed or bombed), (x_{10} The opening of society through the revolution of modern information such as Internet and satellite channels), (x_{11} a try to obtain a beautiful body or a pompous image of the arm or body), (x_{12} disintegration of the value system, family and social circumstances due to the country),(x_{13} Lack of religious knowledge of the tattoo taboos).

4-2-2 Test the significance of all variables (causes of the spread of tattoos) in the discriminatory function

The significance of each variable is examined in order to determine the importance of each variable in the characteristic function and in the process of classification of the most important reasons leading to tattoo widespread and its effect on the analysis of the results using the F test and as it is shown in table (3).

Table (2) testing the significance of F for each variable in the discriminant function

Variables	Wilks' Lambda	F	df1	df2	Sig.
X_1	.983	1.861	3	321	.136
X_2	.826	22.494	3	321	.000
X_3	.920	9.304	3	321	.000
X_4	.976	2.632	3	321	.070
X_5	.978	2.403	3	321	.068
X_6	.883	14.123	3	321	.000
X_7	.908	10.793	3	321	.000

X_8	.939	6.963	3	321	.000
X_9	.920	9.367	3	321	.000
X_{10}	.924	8.847	3	321	.000
X_{11}	.902	11.596	3	321	.000
X_{12}	.662	54.606	3	321	.000
X_{13}	.933	7.640	3	321	.000

From the above table, we see that the variable x_{12} , **(the disintegration of the value system, family and society due to the conditions experienced by the country)**, is characterized by high significant and has a great influence on the classification of students' answers, and distinguishing them as one of the reasons that lead the young to tattoo work, followed by the variable x_2 (**X_2 the absence of media awareness among people about the risks of tattoo and diseases it causes),** It has a significant but less significant effect**,** and followed by the variables x_6, x_{11} , x_7, x_{10} but with less influence and (are considered as the main causes of tattoo work from the point of view of college students), while the rest of the variables have a weak effect and cannot be considered as the main reasons for tattoo work.

4-3 interpreting the parameters of the standard discriminatory functions

The number of discriminatory functions is determined by the following rule (The least number (number of groups -1) and (the number of total variables) And if we assume that we have three groups and five variables, the number of discriminatory functions equals:-

Number of groups -1 = 3-1 = 2

Total number of variables = 5

Therefore, the number of discriminatory functions in our research is

Number of groups 4-1 = 3

So the total number of variables = 13 variables, so the number of discriminatory functions is three functions as shown in the following table:

Table (3) Estimation of standard discriminatory function coefficients

Variables	Function		
	1	2	3
X_1	.116	.251	.274
X_2	.129	.315	.271
X_3	.327	.143	.455
X_4	.203	.217	.203
X_5	.040	.960	.227
X_6	.495	.268	.080
X_7	.278	.418	.398

X_8	.046	.209	.060
X_9	.217	.181	1.055
X_{10}	.398	.102	.186
X_{11}	.381	.068	.353
X_{12}	1.033	.137	.053
X_{13}	.326	.591	.005

The table above shows the estimation of the coefficients of the three discriminative functions. We observe that the variable x_3 in the first discriminant function has a high effect with positive impact on the student's answers to discrimination to the causes of tattoo propagation, followed by the variables x_4, x_7 , x_9 respectively, were of a less positive contribution, while the variable x_6, for the same discriminatory function was a significant negative contribution to the students' answers discrimination, followed by x_{10}, x_{11}, x_{13} with the lowest negative contribution.

For the second discriminant function, the variable x_5 has a high effect and contributes positively to the student's answers discrimination, followed by the variables x_{13} and x_2 then the variables x_4 and x_1 , while the variable x_6 contributes a high negative contribution to the identification of the answers discrimination.

For the third discriminant function, the variables x_7, x_{11} have a high effect with positive impact on the student's answers to discrimination to the causes of tattoo propagation, while the x_3 contributes a high negative contribution followed by the variable x_1 and x_5.

4-4 Test the significance of linear discriminant function

In order to test the significance of the linear discriminant function, the measures shown in Table (4)

Table (4) Measurements used in the test of discriminant function

Function	Eigen value	% of Variance	Cumulative %	Canonical Correlation
1	0.996[a]	55.8	55.8	0.706
2	0.508[a]	28.5	84.2	580
3	282[a]	15.8	100.0	469
Test of Function(s)	Wilks' Lambda	Chi-square	Df	. Sig.
1 through 3	0.259	425.938	39	000
2 through 3	0.517	207.893	24	000
3	0.780	78.263	11	000

From the table above, the differences between the four groups of all the discriminant variables were explained by three discriminatory functions. The first function was interpreted as 55.8 of the total variance, the second 28.5 of the total variance, and the third of 15.8 of the total variance, the correlation coefficients of the three functions was 0.706, 0.580 and 0.468, respectively, and using the **Willks scale**, whose value in the third discriminant function was 0.78, which is close to zero. This indicates the strength of the discrimination function, in addition to using the Chi-square test $^{2}\chi$, which is greater than the table; it can be derived from this that there are significant differences among the variables, I.e. there is a discrimination between the academic stages.

4-5 Classification results

Table (5) Results of classification

			Predicted Group Membership				Total
		Students of study stage	First stage students	Second stage students	Third stage students	Fourth stage students	
Original	Count	1st stage students	83	2	4	5	94
		2nd stage students	12	34	13	20	79
		3rd stage students	9	3	57	2	71
		4th stage students	23	0	0	58	81
	%	1st stage students	88.3	2.1	4.3	5.3	100.0
		2nd stage students	15.2	43.0	16.5	25.3	100.0
		3rd stage students	12.7	4.2	80.3	2.8	100.0
		4th stage students	28.4	.0	.0	71.6	100.0

Table (5) shows that the cases categorized correctly are represented in the table diameter. We notice that 83 with the ratio of (88.3) of the first group with the highest efficiency were classified correctly, and for the third group with the least effectiveness, there are 57 and with ratio of (80.3) were

classified correctly, while for the fourth group, we notice that 58 with the ratio of (71.6) were classified correctly.
The second group is the least effective among the groups, where we note that (34) and ratio of (43.0) were classified as correctly, ie, the total number classified as true is (232) And by ratio (70.77) of the total value (325) students.

5- Conclusions and Recommendations

1 - The results of the first axis (level of knowledge of the risk of tattoos) showed that the evaluation of the knowledge level of first and second stage students was that they have weak knowledge of the risk of tattoos, while the evaluation of the level of knowledge of the third and fourth stage was average and good, respectively.
2 - When using the discriminatory analysis in the second axis of the questionnaire in the discrimination of students' answers on the causes of tattoo spread, three groups were obtained from the results of the discriminatory analysis.
3. The variable X_3 in the first discriminant function and X_5 in the second discriminant function and the X_7 & X_{11} variables in the third discriminant function, have a high effect, they have contributed positively to the causes of the phenomenon of tattoos discrimination, while the X_6 variables in the first & second discriminate functions, and X_3 in the third discriminatory function they have a significant negative contribution to discrimination.
4 - The correct classification rate is 232 of the students 'answers correctly classified, while 93 of the students' answers are wrongly categorized so that the correct classification rate for all groups is 70.77%.
5 - Working on health awareness and advertising about it through posters on the streets or television channels about the dangers of tattoos and diseases caused by the work of tattoo because it is considered a modern scourge hit Iraqi youth today.
6 - Coordination between the Ministries of Health and Education on the need to include a decision under the title of health awareness works to spread the risks and diseases caused by tattoos.

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