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Identification And Classification of Tattoos In Autopsies; A Retrospective Study

Otopsilerde Karşılaşılan Dövmelerin Retrospektif Olarak Tanımlanması Ve Sınıflandırılması

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ABSTRACT

Objective: Figures created under the skin using Indian ink or carbon are called tattoos. Each figure has different meanings, such as freedom and sexuality. In forensic medicine, tattoos are used for human identification. Tattoos can help determine the origin of death by providing information about individuals' lifestyles. Our study aims to analyze the profile of tattoos, define and classify tattoos, and emphasize their importance in forensic medicine. Additionally, we aimed to reveal whether there was a difference between the origins of death in our cases.

Methods: Tattoos found in cases of natural death and suicide who underwent autopsy between 01/01/2020 and 31/07/2022 in Denizli, were evaluated retrospectively. Analysis was performed using the parameters of number, location, and type of tattoos. This study included 19 natural deaths and 35 suicides. There were 29 (82.9%) male, 6 (17.1%) females who committed suicide. In the natural deaths, there were 16 (84.2%) male, 3 (15.8%) were female. The mean age of suicide cases was 30.34±9.47, natural deaths was 43.84±10.7.

Results: We did not find a significant difference in the number, type, and location of tattoos between suicides and natural deaths. The mean number of tattoos was higher in suicides than in natural deaths, but there was no statistically significant difference in the total number of tattoos between the two groups (p=0.647). Suicides tended to have a higher mean number of shape/geometric/illustrative tattoos, and animal/creature tattoos, compared to natural deaths.

ÖZ

Amaç: Deri altına çini mürekkebi, karbon gibi boyalar kullanılarak oluşturulan şekillere "tatuaj/dövme" denir. Her şekil özgürlük, cinsellik gibi farklı anlamlar içerir. Adli tıpta dövmeler, kimliklendirme amacıyla kullanılır. Dövmeler, bireylerin özgeçmişi ile ilgili bilgiler sunarak ölüm orijininin belirlenmesine yardımcı olabilir. Çalışmamızın amacı; vücut dövmelerinin profilini analiz etmek, karşılaştığımız dövmeleri tanımlamak ve sınıflandırmak ve dövmelerin adli tıp açısından önemini vurgulamaktır. Ayrıca çalışmamızda, olgularımızın ölüm nedenleri arasında anlamlı bir fark olup olmadığını ortaya koymayı amaçladık.

Yöntemler: Denizli'de 01/01/2020-31/07/2022 tarihleri arasında medikolegal otopsi yapılan, orijini doğal ölüm ve intihar olan olgularda bulunan dövmeler retrospektif olarak değerlendirildi. Dövme sayısı, bulunduğu vücut bölgesi ve türü parametreleri esas alınarak analiz yapıldı. Çalışmaya, 19 doğal ölüm ve 35 intihar olgusu dahil edildi. İntihar olgularının 29 (%82.9)'u erkek ve 6 (%17.1)'sı kadın idi. Doğal ölüm olgularının ise, 16 (%84.2)'sı erkek ve 3 (%15.8)'ü kadın idi. İntihar olgularının yaş ortalaması 30.34±9.47 olup, doğal ölümlerin 43.84±10.7 idi.

Bulgular: İntihar ve doğal ölümler arasında dövme sayısı, türü ve yeri açısından anlamlı bir fark tespit edilmedi. Ortalama dövme sayısı, intiharlarda doğal ölümlere göre daha yüksekti, ancak iki grup arasında toplam dövme sayısı açısından istatistiksel olarak anlamlı bir fark yoktu (p=0.647). İntihar olguları, doğal ölümlere göre daha fazla sayıda şekil/geometrik/ilüstrasyon ve hayvan/yaratık dövmesine sahip olma eğilimindeydi.

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Conclusion: In our study, the tattoos were described in detail, analyzed according to the origin of death, and contributed to the literature on tattoo figures.

Keywords: Tattoos, autopsy, suicide, forensic medicine

Sonuç: Çalışmamızda dövmeler detaylı olarak tanımlandı. Ölüm orijinleri de dikkate alınarak analiz yapıldı ve elde edilen bilgilerle literatüre katkı sağlandı.

Anahtar Sözcükler: Tatuaj, dövme, otopsi, intihar, adli tıp

INTRODUCTION

Tattoos are created by injecting various dyes, such as Indian ink (1), indigo (1), or carbon (1), under the skin using various techniques. Tattoos are a multidisciplinary formation involving criminology, anthropology, and forensic sciences. With these figures, people wanted to show other people the group they belonged to, their religious beliefs, social status, profession, emotions, and thoughts (2). Tattoos express love, independence, challenge, and sexual preferences. Most young people acquire tattoos to seek identity, accept, and self-expression (2). Although the prevalence of tattoos was found to be 10-16% in adults in studies, it was understood that this rate increased to 25% in some age groups (3-6). Tattoos are associated with sailors, prisoners, and gang members, depending on their design, location, and number. The characteristics of the tattoo may provide clues specific to the deceased individual's past (3,4). It may also help determine the origin of death. For example, drug addicts may opt for tattoo motifs featuring marijuana leaves or a syringe (3). Some tattoo figures may depict people's political views or religious beliefs (4). Text tattoos include names and dates that are important to people (3). It has also been observed that tattoos are associated with psychopathologies such as depression, suicidal tendencies, and psychiatric disorders (5,7).

Determining the identities of people is necessary in forensic medicine (8). In autopsies, tattoos are included in external examination and can help identify unidentified bodies (8). Fingerprint or DNA analysis is the primary method for identifying unidentified bodies. Scars, nevi, and tattoos on people's bodies are secondary methods. Primary methods are expensive and can exceed the budget (9). However, tattoos are secondary identifiers that are useful for identifying disaster victims, especially in natural disasters where many bodies are found (9).

In forensic medicine, the origins of death are categorized as accidental, suicidal, homicidal, natural, and unknown (10). Many studies have been conducted on whether tattoos, which show meaningful signs of people's lives, manifest in different ways among the origins of death (11,12). In this study, we aimed to analyze the profile of tattoos, which is the reflection of symbolism on the human body, and to help forensic experts identify and classify these types of tattoos while practicing their profession. Additionally, we aimed to reveal whether there was a difference between the origins of death in our cases and to emphasize the importance of tattoos in forensic medicine.

MATERIALS and METHODS

In this study, tattoos were found in natural death and suicide cases over 15 years of age and those who underwent autopsy between 01/01/2020-31/07/2022 at Pamukkale University Faculty of Medicine, Department of Forensic Medicine, were retrospectively evaluated. The reason why suicide and natural deaths were chosen was to reveal whether there was a statistical significance between these two types of death origin in terms of the number, type, and location of tattoos. This study included 19 natural deaths and 35 suicide cases. The origin was determined from the crime scene investigation reports and witness statements in the forensic investigation file. There were 29 (82.9%) male and 6 (17.1%) female in the suicide cases. In the natural deaths, there were 16 (84.2%) male and 3 (15.8%) were female. The mean age of suicide cases was 30.34±9.47 years and natural deaths was 43.84±10.7 years. In this study, the tattoos were analyzed based on the number, type, text language, location parameters. The age, sex, and cause of death parameters were also considered. The number of tattoos was classified as 1, 2-3, 4-6, and 7 or more. The types of tattoos were categorized: shape/geometric/illustrative, lettering (text), initial letter, animal/creature, number, and portrait. The locations were classified as head/neck, chest, right upper extremity, left upper extremity, back, abdomen, right lower extremity, and left lower extremity. Before starting the study, permission was obtained from the Pamukkale University Non-Interventional Clinical Research Ethics Committee (approval number: 12, date: 16.08.2022). This study was conducted in line with the principles of the Declaration of Helsinki.

Statistical Analysis

All statistical analyses were performed using SPSS version 29. Descriptive statistics were presented as frequencies and percentages for categorical variables, mean, standard deviation, median, and interquartile range (IQR) for continuous variables. The normality of distribution of the variables was checked using the Kolmogorov-Smirnov test. The Chi-square test was used to compare categorical variables. Mann-Whitney U test and Kruskal-Wallis tests were used to compare continuous variables because the data did not fit the normal distribution. All comparisons were two-sided, and a p-value <0.05 was considered significant

RESULTS

In Pamukkale University Faculty of Medicine, Department of Forensic Medicine, 1199 autopsy were performed between 01/01/2020 and 31/07/2022. It was observed that 300 (25%) of these cases were natural deaths, 221 (18%) were suicides. Tattoos were found in 19(6%) cases of natural deaths and 35(16%) cases of suicide. In our study, there were 29 (82.9%) male and 6 (17.1%) female in the suicide cases. In the natural deaths, there were 16 (84.2%) male and 3(15.8%) female (p=0,899). When we compared the cases according to age, suicide cases had a significantly younger mean age (Mean±standard deviation (SD)=30.34±9.47 years) compared to natural deaths (Mean±SD=43.84±10.7 years) (p<0.001). Most suicide cases (n=27, 77.2%) were between 1939 years of age, whereas only 31.6% (n=6) of natural deaths occurred in this age group (Table 1). When we looked at the causes of death; natural deaths were due to cardiac diseases. As for suicides; there were 25 (71.4%) participants were

hanging, 7 (20%) had gunshot wounds, 1(2.9%) had drug intoxication, 1 (2.9%) had a stab wound, and 1 (2.9%) had jumped from a height. The mean tattoo number in females (Mean±SD=5.22±5.49) were higher than that in males (Mean±SD=3.36±4.19), but this difference was not statistically significant (p=0.180). The mean tattoo number in cases aged 19-29 (Mean±SD=6.13±7.18) were higher than that in the other age groups. However, it was also not statistically significant (p=0.172). Although the mean number of tattoos in suicides (Mean±SD=4.03±5.18) were higher than that in natural deaths (Mean±SD=3.00±2.49), there was no statistically significant difference in the total number of tattoos between the two groups (p=0.647). When we analyzed the number of tattoos according to subgroups; by sex, there was no statistically significant difference in the number of tattoos between males and females (p=0.059). There was no statistically significant difference in the number of tattoos among different age groups (p=0.463). 50% of people aged 30-39 (n=9) had one tattoo and 75% of people aged 50-59 (n=3) had one tattoo, while 20% of people aged 19-29(n=3) had seven or more tattoos and 50% of people aged 60 or more(n=1) had seven or more tattoos. Manner of death also did not exhibit a statistically significant difference in the number of tattoos (p=0.812). 11.4% of suicides (n=4) had seven or more tattoos and 25.7% of suicides(n=9) had 4-6 tattoos, compared to 15.8%(n=3) and 15.8%(n=3) of natural deaths, respectively (Table 2). The current study revealed that the most common type of tattoo among both suicide and natural death cases was shape/geometric/illustrative, with 68.9% (n=24) and 68.4% (n=13), respectively, followed by lettering 62.9% (n=22) and 52.6% (n=10) respectively. The least common type of tattoo among both suicide and natural death cases was number 5.7% (n=2) and 5.3% (n=1) respectively, followed by initial letter, with 11.4% (n=4) and 15.8% (n=3), respectively. The only type of tattoo that showed a noticeable difference between suicide and natural death cases was animal/creature, with 14.3% (n=5) and 31.6% (n=6) respectively, but this difference was not statistically significant (p=0.166). Our study showed that; the most common language among both lettering (text) and initial letter tattoos was Turkish, with 71.9% (n=23) and 71.4% (n=5) respectively. The distribution of initial letter and lettering(text) tattoos did not differ significantly between the specified languages (p=0.244, 1). The most common suicide location was the left upper extremity, with 77.1% (n=27), followed by the right upper extremity, with 51.4% (n=18). The least common locations of suicide were the abdomen and right and left lower extremities, with 2.9% (n=1) each. The most common location among natural death was the left upper extremity, with 68.4% (n=13), followed by the right upper extremity 68.4% (n=13). The least common locations of natural death were the head/neck and abdomen, with 0% (n=0) each. The only tattoo location that showed a noticeable difference between suicide and natural death was the head/neck, with 11.4% (n=4) and 0% (n=0) respectively, but this difference was not statistically significant (p=0.285). When we evaluated the relationship between the total number of tattoos and tattoo types in our study; cases with suicides and shape/geometric/illustrative tattoos had a significantly higher mean number of tattoos (Mean±SD=5.13±5.94) compared to those without such tattoos (p=0.007). Cases with suicides and animal/creature tattoos had a significantly higher mean number of tattoos (Mean±SD=8.40±9.91) compared with those without such tattoos (p=0.033). Cases who died by natural causes had significantly more lettering(text) tattoos (Mean±SD=4.30±2.75) than those who did not (p=0.015). Specifically, cases with suicides tended to have a higher mean number of shape/geometric/illustrative tattoos, and animal/creature tattoos, compared to those with natural deaths (Table 3). Cases with suicides had significantly more tattoos on their head/neck (Mean±SD=10.50±10.66), chest (Mean±SD=7.42±7.77), back (Mean±SD=6.20±4.14), and right upper extremity (Mean±SD=6.33±6.44) than cases with natural deaths (p=0.029, 0.023, 0.047, and <0.001 respectively). Natural deaths also had significantly more tattoos on their chests (Mean±SD=6.40±2.07) than suicides (p=0.002) (Table 4). The tattoos used in our cases are described in detail in Tables 5 and 6.

Table 1. Comparison of suicide and natural death cases by age

Age	Suicide	Natural Death
Mean±SD	30.34±9.47	43.84±10.7
p	<0.001	
Age groups	n (%)	n(%)
15-18 years	3 (8.6)	0 (0)
19-29 years	12 (34.3)	3 (15.8)
30-39 years	15 (42.9)	3 (15.8)
40-49 years	4 (11.4)	8 (42.1)
50-59 years	0 (0)	4 (21.1)
≥60 years	1 (2.9)	1 (5.3)
p value	<0.001	

*The Chi-square test was used for comparison by age groups. Mann-Whitney U test was used for comparison by age means,
SD: Standard deviation

Table 2. Distribution of tattoos by sex, age groups, manner of death

Characteristics	Number of tattoos			
	1 n (%)	2-3 n (%)	4-6 n (%)	≥7 n (%)
Sex				
Male	19 (42.2)	11 (24.4)	11 (24.4)	4 (8.9)
Female	1 (11.1)	4 (44.4)	1 (11.1)	3 (33.3)
p	0.059			
Age groups				
15-18 years	1 (33.3)	1 (33.3)	1 (33.3)	0 (0)
19-29 years	3 (20.0)	4 (26.7)	5 (33.3)	3 (20.0)
30-39 years	9 (50.0)	3 (16.7)	5 (27.8)	1 (5.6)
40-49 years	4 (33.3)	5 (41.7)	1 (8.3)	2 (16.7)
50-59 years	3 (75.0)	1 (25.0)	0 (0)	0 (0)
≥60 years	0 (0)	1 (50.0)	0 (0)	1 (50.0)
p	0.463			
Manner of death				
Suicide	12 (34.3)	10 (28.6)	9 (25.7)	4 (11.4)
Natural death	8 (42.1)	5 (26.3)	3 (15.8)	3 (15.8)
p	0.812			

*The Chi-square test was used

Table 3. Comparison of tattoo types

	Suicide deaths	Natural deaths	All deaths
Type of tattoo	**Total number of tattoo Mean±SD**	**Total number of tattoo Mean±SD**	**Total number of tattoo Mean±SD**
Shape/geometric/ illustrative			
Yes	5.13±5.94	3.38±2.53	4.51±5.04
No	1.64±1.02	2.17±2.40	1.82±1.59
p	0.007	0.170	0.003
Lettering (Text)			
Yes	4.19±6.02	4.30±2.75	4.72±5.18
No	2.54±2.98	1.56±1.01	2.14±2.39
p	0.068	0.015	0.003
Initial letter			
Yes	3.50±1.00	5.67±4.04	4.43±2.69
No	4.10±5.51	2.50±1.89	3.55±4.64
p	0.312	0.180	0.114
Animal/creature			
Yes	8.40±9.91	4.67±3.20	6.36±6.94
No	3.30±3.76	2.23±1.73	2.98±3.29
p	0.033	0.131	0.015
Number			
Yes	1.50±0.70	2.00	3.67±1.52
No	4.00±5.34	3.06±2.55	3.67±4.55
p	0.189	1	0.311
Portrait			
Yes	6.83±9.49	8.00	8.67±3.28
No	3.45±3.81	2.72±2.24	3.29±0.48
p	0.271	0.106	0.094

*Mann-Whitney U test was used,
SD: Standard deviation

Table 4. Comparison of total number of tattoos by location

	Suicide deaths	Natural deaths	All deaths
Location of tattoo	**Total number of tattoo Mean±SD**	**Total number of tattoo Mean±SD**	**Total number of tattoo Mean±SD**
Head/neck			
Yes	10.50±10.66	-	10.50±10.66
No	3.19±3.58	3.00±2.49	3.12±3.18
p	0.029	-	0.022
Chest			
Yes	7.42±7.77	6.40±2.07	7.12±6.54
No	2.26±1.35	1.79±1.12	2.08±1.27
p	0.023	0.002	<0.001
Back			
Yes	6.20±4.14	5.50±3.53	6.00±3.69
No	3.67±5.31	2.71±2.31	3.32±4.45
p	0.047	0.128	0.010
Abdomen			
Yes	9.00	-	9.00
No	3.88±5.19	3.00±2.49	3.57±4.40
p	0.155	-	0.120
Right upper extremity			
Yes	6.33±6.44	3.69±2.72	5.23±5.31
No	1.59±0.87	1.50±0.83	1.57±0.84
p	<0.001	0.075	<0.001
Left upper extremity			
Yes	4.44±5.66	3.69±2.72	4.20±4.87
No	2.63±2.92	1.50±0.83	2.14±2.28
p	0.164	0.075	0.023
Right lower extremity			
Yes	4.00	-	4.00
No	4.03±5.26	3.00±2.49	3.66±4.47
p	0.477	-	0.447
Left lower extremity			
Yes	12.00	4.00	8.00±5.65
No	3.79±5.07	2.94±2.55	3.50±4.35
p	0.127	0.392	0.089

*Mann-Whitney U test was used,
SD: Standard deviation

DISCUSSION

Our study is important in forensic medicine because it includes forensic autopsy cases. The study contributes to the literature on different tattoo figures for studies examining tattoo profiles in larger populations and in many cases. Additionally, the study revealed that there may be a relationship between tattoos and suicide, and the importance of tattoos in terms of forensic medicine was emphasized.

Sex

It was determined that there were more men than women in our study. However, no statistically significant difference was detected in the number of tattoos according to sex. In another study conducted in our country, it was observed that 92.1% of the tattooed cases were males (13).

Age

When the cases in our study were evaluated according to age groups; it was observed that in the natural death group, most cases were in the 40-49 age group, and in the suicide group, most cases were in the 30-39 age group. In similar studies; in the study of Kayser et al. (13) it was understood that 44% of the cases were in the 19-29 age group. It was observed that the mean number of tattoos was higher in this age group.

Body Locations of Tattoos

The preferred body location for tattooing may be related to the individual's personal, social, or professional situations. While some people prefer visible parts of their body, such as hands and arms,

Table 5. Tattoos of natural deaths

Case No	Age	Sex	Total number	Type	Locatıon	Some Details
1	54	M	1	Animal/creature	RUE	-Eagle
2	55	M	1	Shape/geometric/illustrative	RUE	-Salvador Dali's chart of melting clocks
3	42	M	4	Lettering (text)	RUE	-"İnsafsız"
				shape/geometric/illustrative animal/ creature	LUE	-Heart-sword
						-Snake wrapped around a sword
4	37	M	3	Lettering (text)	RUE	-"Börteçine"
				shape/geometric/illustrative	LUE	-3 crescents-stars
5	38	M	1	Lettering (text)	RUE	-"Tolgahan" ın an unıdentıfıed fıgure
				shape/geometric/illustrative		
6	42	M	2	Shape/geometric/illustrative	RUE	-Map like figure
7	48	M	1	Lettering (text)	LUE	-Meanıngless word (arabıc)
8	44	F	7	Lettering (text)	RUE	-Understandable words
					LUE	
					Chest	
9	67	M	8	Lettering (text) shape/geometric/ illustrative	RUE	-Birds-gun
					LUE	-"dilek"-"ermiş"
				portrait	Chest	- Woman portraıt
				ınitial letter	Back	
				animal/creature		
10	29	M	6	Lettering (text)	RUE	-"Annem"
				shape/geometric/illustrative animal/ creature	LUE	-Trıbal pattern
					Chest	- King's crown
						-Unıdentıfıed creature
11	29	F	2	Lettering (text)	RUE	-"Duduş"
					LUE	-"İbrahim"
12	37	M	1	Shape/geometric/illustrative	RUE	-Saılor anchor
13	45	M	1	Animal/creature	LUE	-Dragon
14	49	M	1	Initial letter	LUE	-"E"-"H"
15	41	M	8	Lettering (text)	RUE	-Flower
				shape/geometric/illustrative ınitial letter	LUE	-Crescent
				animal/creature	Chest	-Stars
						-Points
						-Heart
						-"Neşenur"
						-"İlle de sen"
						-"I"-"k"
						-wolf
						-Bird
16	52	F	2	Shape/geometric/illustrative number	LUE	-Unidentifıed figure
						-44
17	58	M	1	Shape/geometric/illustrative	LUE	-Star
						-Crescent

Table 5. Tattoos of natural deaths

Case No	Age	Sex	Total number	Type	Locatıon	Some Details
18	43	M	3	Lettering (text) shape/geometric/illustrative	Chest Back	-Sword -“Allah var gam yok melakem” -“Gallo”
19	23	M	4	Shape/geometric/illustrative	RUE LUE LLE	-Unıdentifıed figure

LLE: Left lower extremity, LUE: Left upper extremity, RLE: Right lower extremity, RUE: Right upper extremity

Table 6. Tattoos of suicides

Case No	Age	Sex	Total number	Type	Location	Some Details
1	37	M	1	Lettering(text)	RUE	-“Sensizim”
2	31	M	1	Portrait	RUE	-Woman with a gun
3	23	M	26	Shape/geometric/illustrative lettering(text) animal/ creature portrait	Head/Neck RUE LUE Chest	-Bird-rose -Gun-star -Rocket-bottle -Unidentified figures -“Taylor gang or die” -Man portrait
4	31	F	4	Shape/geometric/illustrative lettering(text) initial letter	RUE LUE Back RLE	-“Galiya” -Seaningless words -Unidentified figures - King’s crown
5	30	M	1	Shape/geometric/illustrative	LUE	-Puzzle
6	27	M	1	Lettering(text)	LUE	-“Canım annem”
7	21	M	1	Shape/geometric/illustrative	Chest	-Star
8	36	M	2	Shape/geometric/illustrative	LUE	-Heart-flower
9	42	M	1	Lettering(text)	Chest	-“Vera”
10	65	M	2	Shape/geometric/illustrative Initial letter	LUE	-Cyprus map -“Ktbk”
11	37	M	4	Lettering(text) animal/creature	RUE LUE Chest	-“Sevilay” -“Gülüşüm” - Wolf head - Runic 4 letters
12	26	F	2	Shape/geometric/illustrative Lettering(text)	Chest	-“Kağan” - King’s crown
13	27	M	1	Lettering(text)	LUE	-Meaningless word (chinese)
14	44	M	2	Shape/geometric/illustrative animal/creature	LUE Back	-Rose-dragon

Table 6. Continued

Case No	Age	Sex	Total number	Type	Location	Some Details
15	25	F	18	Shape/geometric/illustrative lettering(text)	RUE LUE Chest	-Rose-heart -Bird-star -King's crown -Infinity figure -"Annem"-"ela" -"Sedat"-"aras" -"Azra"
16	23	M	2	Lettering(text)	LUE	-"Mısram" -"Annem"
17	40	F	2	Lettering(text) portrait	RUE LUE	-Che portrait -"Sedefim"
18	17	M	6	Shape/geometric/illustrative lettering(text)	RUE LUE Chest	-Chamomile -King's crown -Cats -"Annem"-"bedel" -"Eftal"
19	42	M	2	Shape/geometric/illustrative	RUE LUE	-Chamomile -Unidentified figure
20	25	M	12	Shape/geometric/illustrative	RUE LUE Chest Back LLE	-Unidentified figure -Tribal pattern
21	33	M	1	Shape/geometric/illustrative	LUE	-Tribal pattern
22	25	M	5	Shape/geometric/illustrative lettering(text)	RUE LUE Chest	-Unidentified figure -Tribal pattern -"Vedat" -"Havva"-"mert"
23	32	M	4	Shape/geometric/illustrative lettering(text) initial letter portrait	RUE LUE	-Bjk flag -Atatürk portrait -"Gökhan" -Arabic letters -"La vittoria sara nostra"
24	36	M	1	Shape/geometric/illustrative	LUE	-Sword
25	17	F	1	Shape/geometric/illustrative	LUE	-Angel wings
26	19	M	5	Shape/geometric/illustrative lettering(text) animal/creature number portrait	RUE	-Smoking in the mouth -Devil-lips -Broken chain -"Yes"-"beast" -"Enjoy every day" -Woman portrait
27	17	M	3	Shape/geometric/illustrative lettering(text)	Head/Neck RUE LUE	-"Marley"-"tim" -Rose

Table 6. Continued

Case No	Age	Sex	Total number	Type	Location	Some Details
28	31	M	1	Lettering(text)	Chest	-“Alibuba”
29	33	M	1	Lettering(text)	LUE	-“Trust nobody”
30	22	M	4	Shape/geometric/illustrative initial letter number	Head/Neck Back LUE	-Kalashnikov -Lion king
31	30	F	9	Shape/geometric/illustrative lettering(text)	Head/Neck RUE Chest Back Abdomen	-Baby-crown -Infinity figure -Flower -“Sedat”
32	35	M	3	Lettering(text)	RUE LUE	-“Eylül” -“Ezgi” -“Gülçin”
33	23	M	3	Shape/geometric/illustrative portrait	LUE	-Scissors -Smiling face
34	30	M	5	Shape/geometric/illustrative lettering(text) animal/creature	RUE LUE	-“Sevcan”- “zalim” -star -wolf
35	30	M	4	Shape/geometric/illustrative lettering(text)	RUE LUE Chest	-“Gazi M. Kemal” -“Ömer-bahar” -“My life my rules”

LLE: Left lower extremity, LUE: Left upper extremity, RLE: Right lower extremity, RUE: Right upper extremity

others may choose invisible areas like genitals or breasts, to be more sexually attractive (14). It was observed that the most preferred location in our study was the left upper extremity. In a similar study, it was observed that 60.6% of the tattoos were on the arm, 12.7% on the hand, and 10.1% on the shoulder. In this regard, the suitability of the skin structure and esthetic factors could be important factors (13). It was understood that one patient in our study had a tattoo to hide the cesarean section scar in her abdomen (Figure 1).

Types of Tattoos and Tattoo Figures

Tattoos are a form of communication that people use to communicate or express themselves. Our study showed that the most common type of tattoo was shape, geometric, or illustration. In a similar study, lettering(text) was found to be the most common type of tattoo (13). It was understood that lettering (text) tattoos were the second most common. It is understood that not much work has been done on the language of textual tattoos. The most common language detected in our study was Turkish. We think that this may be because we studied a small but local population. A study found that white Hispanics preferred Spanish, whereas non-Hispanic whites preferred English (5). We believe that the tattoo language chosen by people is mainly related to the country and culture in which they live, although they may also prefer different languages due to cultural interaction and influence from the media.

Figure 1. A tattoo with flower and bird figures (at the tips of the arrows) in suicide case no. 31 was made to hide the cesarean section scar on the abdomen

A wide variety of figures were found in the shape, geometric, and illustration tattoos in our study. Additionally, it was seen that there were different figures in the animal-createature and portrait tattoos (Tables 5-6). While some people prefer more primitive figures and prison tattoos, others prefer figures from works of art with fine lines (15). As a matter of fact, in our study, "Salvador Dali’s melting clocks painting" was found in 1 case (Figure 2a). In the literature, we see that in some cases there are commemorative tattoos that remind family members (16); in some cases, political or racist tattoos

Figure 2. (a): A tattoo figure designed as "Salvador Dali's Melting Clocks Painting" in the lateral region of the proximal part of the right upper extremity in case no: 2 (at the tips of the arrows). (b): Tattoo figures designed as a portrait of "Atatürk" (at the tip of the left arrow) and the BJK flag (at the tip of the right arrow) in the lateral region of the proximal part of the left upper extremity in suicide case no: 23.

featuring Ned Kelly, swastikas, or power figures have been detected (17). In our study, there was a portrait of "Atatürk" in 1 case (Figure 2b), a portrait of "Che" in 1 case, crescent star figures in 1 case, and the names of family members in more than one case. It is clear from these examples that each individual has different emotional and thought motivations when seeking a tattoo.

The current study revealed that the mean number of tattoos was higher in suicide cases with tattoos of shape/geometric/illustrative or animal/creature. Similarly, the risk of suicide was found to be high in subjects with "Ned Kelly" tattoos (17). Our study showed that the mean number of tattoos was higher in suicide cases, but no statistically significant difference was detected between the two groups. In the literature, the shape and meaning of tattoos are believed to be more important than their number (18). When we analyzed all the results obtained from our study, we found that the number of tattoos was not associated with suicide risk. To reveal the relationship between tattoos and suicide risk, individuals' psychiatric disorders and sociodemographic characteristics should also be evaluated in addition to tattoo content (7). In the literature, a study contained data on the figures and meanings of tattoos (19). For example; images such as daggers and skulls: pride in the use of violence; ankle chains: imprisonment; flowers on the forearm: a criminal lifestyle is adopted; it carries meanings (19). Similar figures were also found in our study (Figures 3a,3b). For example, one of our patients had a tattoo containing a "chain" figure, and this patient preferred hanging with a chain as a suicide method (Figure 3c). The meaning behind tattoos can provide clues about a person's background and current life. Future studies could investigate the association between the population and specific tattoos using data obtained from a wide range of different populations subdivided according to their epidemiological characteristics. Likewise, by analyzing the meanings of tattoo figures according to people's behavioral characteristics, comprehensive data records can be created regarding the meaning of the figures. Elucidating the meanings of tattoo figures will also help approach cases in clinical

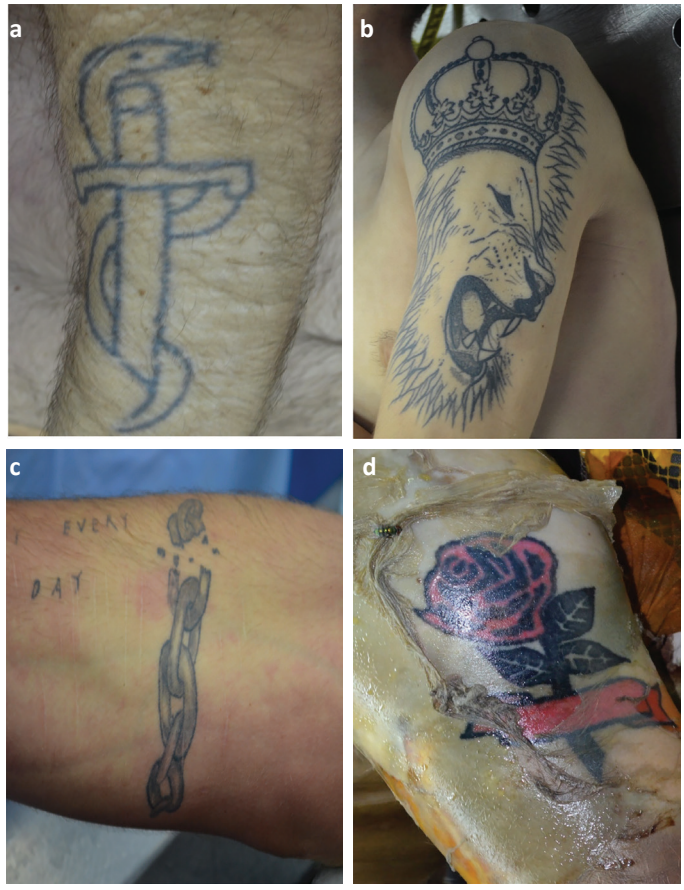

Figure 3. (a): A primitive tattoo with a snake (at the tip of the left arrow) wrapped around a sword (at the tip of the right arrow) in the lateral region of the right upper extremity in natural death case no: 3. (b): A tattoo with lion king in the lateral region of the left upper extremity in suicide case no. 30 (at the tip of the arrow). (c): A tattoo with broken chain in the antecubital region of the right upper extremity in suicide case no: 26 (at the tip of the arrow). (d): A tattoo with rose in the lateral region of the left upper extremity in suicide case no: 14. Despite skin slippage and discoloration rose tattoo is recognizable on a decomposed corpse (at the tip of the arrow)

forensic medicine. In forensic science, tattoos not only give clues about a person's life but also help identify unidentified corpses and contribute to the investigation. It can speed identification, especially during large mass disasters where many unidentified bodies are found (8,9). Because tattoo pigments spread into the deep layers of the dermal tissue, tattoos can be distinguished even in corpses where decomposition has begun or whose integrity has been compromised (3). In our study, the tattoo in a decayed patient was easily distinguished and contributed to identification (Figure 3d). Tattoos are skeletal identifiers, such as wormian bones, that are used to identify unidentified corpses (20). As the analysis of wormian bones contributes to the reconstruction of the biological profile (20), tattoos can also aid in reconstructing the biological profile of corpses, with the information obtained from more comprehensive studies that analyze the frequency of specific tattoo figures in a specific age, gender, or society. In addition, observing tattoo figures in individuals with specific psychopathological diagnoses may potentially aid in the early detection of some psychopathologies (5,7). Standardization of the definition and classification of tattoos

is necessary for objective research. For example; If a “rose” tattoo as a figure is reported as a “flower”, it will cause data confusion (21). In Brookes and Thompson’s study, tattoo motifs are categorized as human forms, animals, plants, flags, objects, symbols, abstractions, and other images in an ANSI/NIST ITL 1-2000 classification (22). In our study, tattoo types were categorized as shape/geometric/ illustrative, lettering(text), initial letter, animal/creature, number, and portrait. We hope that the detailed tattoo figures in our study will contribute to comprehensive studies to be carried out.

Study Limitations

The limitations of this study were that the data belonged to a single center, the total number of cases was low, and thus, the type of tattoos and figures did not show sufficient variety.

CONCLUSION

In conclusion, tattoos are important in forensic medicine. Tattoo figures that provide clues about people’s lives are not only a part of external examination but can also contribute to determining the origin of death. Our study included medicolegal autopsy cases. Unlike previous studies, the present study examined all tattoo figures on the body of the cases, and all figures were described and classified in detail. The study differs in that the relationship between tattoos and suicide was investigated. Our study contributes to the literature on different tattoo figures to examine tattoo profiles in larger populations. The study revealed that there may be a relationship between tattoos and suicide. More comprehensive studies on this subject are required.

Ethics

Ethics Committee Approval: It was obtained from the Pamukkale University Non-Interventional Clinical Research Ethics Committee (approval number: 12, date:16.08.2022). This study was conducted in line with the principles of the Declaration of Helsinki.

Informed Consent: Retrospective study.

Footnotes

Authorship Contributions

Concept: H.K.A.Ö., K.A., Design: H.K.A.Ö, K.A., A.K.D., Supervision: K.A., A.K.D., Resources: K.A., Material: H.K.A.Ö, Data Collection or Processing: H.K.A.Ö, Analysis or Interpretation: H.K.A., K.A., A.K.D.,

Literature Search: H.K.A., K.A., A.K.D.,Writing: H.K.A., K.A.

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