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Level of Experiences in Processing of Biological Forensic Traces at the Crime Scene among Palestinian Police Employees

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Abstract

Crime Scene Investigation (CSI) means taking all lawful methods, processes and procedures that lead to solving crimes and detecting the truth.This study aimed to evaluate the Palestinian Police Agency (PPA) employees' perceptions towards the experiences in the documentation, collection, preservation, packaging and transportation of biological traces from the scene of crime. An item-based questionnaire was designed with this aim in mind, and its reliability as well as validity were tested. The study's target group included (244) PPA-affiliated crime scene investigators and officers who served in the governorates of Hebron, Jenin, and Ramallah during summer of 2022. The majority of respondents expressed agreement or neutrality regarding the technical procedures used at the crime scene. In general, PPA employees have positive experiences with the preservation, documentation, collection, packaging, and transportation of biological evidence from the scene. The study's findings make it abundantly evident that the average for each paragraph was greater than (3.57), demonstrating that PPA personnel working at the crime scene generally had sufficient experience handling forensic traces. However, preservation and collection of biological traces especially DNA sources from the crime scene were the lowest with a total averages of (3.40). While the searching and documentation of the crime scene section, andthe packaging and transportation of the biological traces from the scene of the crime the total averages were (3.69) and (3.62) respectively.

In addition, there was a significant difference ($P < 0.05$) between the respondents regarding to the three working places, age, and ranks. This study recommending the decision makers in Palestine to pay attention to the technical procedures at the crime scene and employ a trained team that has sufficient knowledge and skills to deal with biological forensic traces at the crime scene. This study also recommends conducting deeper analytical studies to include all departments and entities working at crime scenes in all governorates in Palestine.

Introduction

Sydney declaration about principles of forensic science, states that activity and presence produce traces that are fundamental vectors of information, and Crime Scene Investigation (CSI) is a scientific and diagnostic endeavor that requires scientific expertise[1]. The process of dealing with a crime scene is time-consuming and laborious. It entails carefully recording the scene's circumstances and gathering any tangible evidence that can shed light on what transpired and identify the perpetrator [2-4]. It is not sufficient to only use scientific tools to analyze traces at a crime scene; one should also consider behavioral factors. Investigative psychology is a valuable tool for resolving investigative issues [5].

CSI is a systematic scientific process that begins with receiving a report about the crime occurring and moving the nearby first officer to the crime scene. This is followed by several procedures that begin with preserving the crime scene by securing and protecting it. Then complete the basic legal procedures. These followed by several necessary operations, such as documenting the crime scene, searching for forensic evidence, documenting, collecting, packaging, labelling, and then carrying it properly to the criminal laboratories for analysis purpose[6-9]. Preserving, analyzing, interpreting, and reconstructing all pertinent physical evidence at a crime scene are crucial CSI techniques.These need for a very high level of accuracy. As a result, processing a crime scene is considered as a vital aspect of an effective forensic investigation [10-12]. Nowadays, reports of serious sever; dangerous and significant crimes are growing. In addition, new trends in crime patterns are emerging virtually daily, making criminal activity more complex. Recently there is attentionto CSI all over the world. Unfortunately, in Palestine narcotic drugs, assault, rape, theft, violence against women and children and various other crimes are on the increase. Theft (57.3%), assaults (19.6%), harassment or assault by Israeli military or settlers (11.8%), property damage (4.8%), and attempted robbery (3.6%) are the most common crimes against people [13]. In 2022, the Palestinian Central Bureau of Statistics (PCBS) reports that the number of criminal offenses in the studied areas in the West Bank in Palestine per 100,000 population were (1909) in Jenin, (1366) in Ramallah and (740) in Hebron [14]. The criminal cases accumulated in front of the Palestinian judiciary are so much and this needs conclusive evidence to resolve them.

In Palestine, the legal authorities designated by statute with the authority to investigate crimes, search, record, and preserve crime scenes are the ones who are granted judicial police status by the legislation. Within the structure of the Palestinian Police Agency (PPA), there is a general directorate for forensic evidence and criminal laboratories, which divided into forensic laboratories, fingerprints, cybercrimes, and CSI departments. This structure also contains the General Directorate of Criminal Investigation and the Criminal Research Directorate. In the newly established criminal laboratories

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department, there is documents, firearms, chemical and biological examination sections. The Palestinian Ministry of Justice resorts to conducting some examinations of biological evidence such as DNA profiling in private laboratories in Palestine or abroad due to the lack of all capabilities to conduct such examinations (The administrative affairs at the PPA command, personal communication).

Biological evidence is a kind of physical evidence with any tangible object of biological origin -not always visible to the naked eye- can be subjected to DNA testing, and routinely used in criminal proceedingsthat can connect a person to a crime scene[8]. At crime scenes, biological forensic traces are searched for due to their importance in criminal investigations. The source of these traces left by the suspect or from another source such as the victim or curious people. Biological forensic evidence includes bloodstains and other body fluids and tissues such as saliva, semen, vaginal secretions, sweat, urine, vomitus, feces, and other body residues such as hair, bones and nails. Biological evidence also includes latent print evidence, such as fingerprints, lip prints, and ear prints.Plant remains, insects, pet hairs, or seeds are examples of biological evidence that can be discovered at the crime scene. In addition to the viral and microbiological organisms [8, 15]. Potential sources of biological traces can include, but are not limited to, the door handle of the house, refrigerator, on the personal objects such as underwear, a cigarette cone, weapons, eyeglasses, hat, masks, cotton, swaps, toothpick, stamp, envelope, used condoms, bottle, can, glass, blanket, pillow, sheet, fingernail. Building furniture, rooms, walls, doors, windows, drawers, vehicles etc. in the crime scene. With the purpose of identifying the perpetrator and solving the crime through the scientifically examine and analyze these biological traces in the forensic labs, by extracting DNA from the cells or fingerprints from the skin [16, 17].

Biological evidence requires special storage, preservation and transport conditions as it is more susceptible to damage and contamination than other evidence at the scene of crime. Blood and other body fluids are exposed to contamination with bacteria and other organisms, which exposes them to damage, DNA degradation and mixing it with other sources of DNA [18]. Therefore, the crime scene team should be trained, skilled and well equipped with the necessary tools and equipment. In order to handle such evidence in terms of preserving, collecting, storing and transporting it appropriately to prevent damage and contamination of this biological evidence. The question of this study is PPA employees ready to handle the biological evidence in the crime scene. In Palestine, crime scene investigation has never been studied before. Therefore, this study is the first attempt to look at the criminal investigations in the crime scene at Palestine, in terms of determining the structure that governs the work of the PPA and revealing the level of skills and capabilities available to those working in this field.

Methodology

Study sample

This survey was a cross sectional descriptive study,simple random sampling was used to obtain the facts.The perceptions of (244) crime scene investigators and employees serving in CSI at the north, south and middle of Palestine were assessedduring summer of (2022). From which (72)serving inHebron, (82) in Jenin, and (90)in Ramallah governorates.

Study tool

A comprehensive online search was done, and information from a literature review[19, 20] was used to create an item-based questionnaire that was used as a tool to assess the experiences of PPA employees and crime scene investigators regarding the technical procedures used at the crime scene. The initial questionnaire was peer reviewed by four faculty staff membersto ensure thecontent validity of it. The final form of the questionnaire was consisted two sections of (39) paragraphs. From which the first section composed from (5) questions personal and demographic variables.The second section contained 34of (5-point Likert scale)closed questions items, were grouped into searching and documentation of the scene (10) paragraphs, preservation and collection of biological evidence from the scene (11) paragraphs, and packaging and transportation of traces from the scene (13) paragraphs.

Statistical analysis

Statistical Package for Social Sciences (SPSS) was used to analyze data from the (224) statistical population. Average and frequency were reported,analysis of variance and t-test were used, and the significance level was set at $P<0.05$.

Results

This study was conducted to assess the Palestinian police employees' perceptions towards the experiences in the technical procedures used in the crime scene such as documentation, collection, preservation, packaging and transportation of biological traces from the scene in three governorates in Palestine. Data collected from (244) respondents from PPA, working in CSI were analyzed with a response rate of 95.5%.

Personal data analysis

Respondents' demographic and personal parameters were evaluated as shown in (Table 1). The studied attributes included; the respondents' age, working places, study level, rank, and number of years serving in the PPA.Analyzed data indicates that most of PPA employees are young, (73.3%)of them ranging from (25 to 45) years old.

Concerning the respondents' level of study, it was found that the majority of them (48%) held bachelor's degree. While (26.6%) until high school, (19.3%) diploma, and (6.1%) had postgraduate certificates. Data analysis also shows that the participants consisted of (19.3%) had served at the PPA for less than six years, (14.8%) had served between (6 to 11) years, and (22.1%) had served between (11 to 16) years. While (43.8%) had worked for more than (16) years (Table 1), (Figure 1).

According to the PPA employees rank, (11.9%) of the respondents holding less than non-commissioned officer rank, (52.9%) of the respondents ranks from lieutenant to captain and (30.3%) were from captain to colonel, while (4.8%) of the respondents were colonel and above. According to the working district, among participants, (29.5%) of the respondents were worked in Hebron, (33.6%) in Jenin and (36.9%) in Ramallah governorate as shown in (Table 1) and (Figure 1).

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Table 1: Distribution of the respondents according to the independent variables

Variables	Category	Frequency	Percentage %
Age	Less than 25	30	12.3
	From 25 to 35	93	38.1
	From 36 to 45	86	35.2
	From 46 to 60	35	14.3
Study level	Until high school	65	26.6
	Diploma for two years	47	19.3
	Undergraduate	117	48
	Postgraduate	15	6.1
Rank	Non-commissioned officer	29	11.9
	From lieutenant to captain	129	52.9
	From captain to colonel	74	30.3
	Colonel and above	12	4.9
Service period at PPA	Less than 6	47	19.3
	From 6 to 11	36	14.8
	From 11 to 16	54	22.1
	More than 16	107	43.8
Workplace	Hebron	72	29.5
	Jenin	82	33.6
	Ramallah	90	36.9

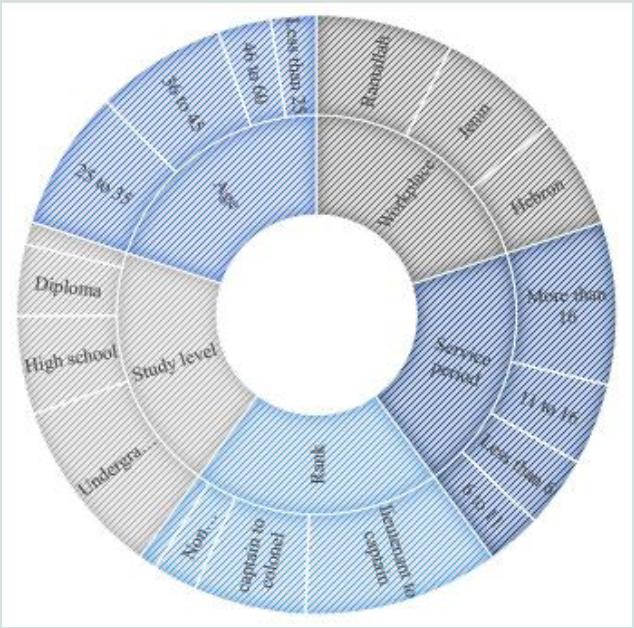

Figure 1: Pie chart showing the percentage of the respondents according to the sociodemographic profiles

Technical procedures evaluating

In order to evaluate the experience of PPA employees in technical procedures used in the crime scene, data collected from (244) questionnaires were analyzed; the overall score came with an average of (3.57) as presented in (Table 2).

The total score for the second section, "collection and preservation of the biological traces from the scene of the crime" was the least average in the experiences, with a totalaverage of (3.40). In this section, the results shows that paragraphs (16-19) aboutexperts who specialize

Table 2: Descriptive statistical analysis of data collected from the Palestinian police employees included in this study,regarding the technical procedures followed at the crime scene.

1. Searching and documentation of the crime scene			
#	Paragraph	Average	SD
	Photography is used in recording and documenting crime scenes.	3.81	1.06
	The written description is used to record and document the crime scene inspection.	3.76	.964
	Video equipment is used to document crime scenes.	3.70	1.06
	The sketch is used to record and document the crime scene inspection.	3.73	1.05
	Crime scene investigators can properly write reports and take required notes.	3.74	.971
	An appropriate searching pattern is adopted for each crime according to circumstance	3.71	.981
	The crime scene team has special instructions for examine biological traces.	3.68	1.00
	There are crime scene investigators that specialized in searching for biological traces.	3.66	.940
	The crime scene team is adequately trained to handle witnesses at crime scenes	3.57	1.01
	All crime scene investigators have the knowledge and skill to reduce contamination	3.52	1.07
	Overall score for the first field	3.69	1.01
2. Collection and preservation of the biological traces from the scene of the crime			
	All kinds of biological traces are collected from the scenes and sent for examination.	3.48	1.12
	The tools and devices for collecting biological traces from the scene are available.	3.45	1.19
	There are experts specialized in dealing with all biological traces in the crime scene.	3.40	1.10
	Crime scene investigators have procedural guides to deal with biological traces	3.67	1.05
	Crime scene investigators have skills in analyzing the pattern of bloodstains.	3.38	1.18
	There are experts who specialize in dealing with chemical traces at the crime scene.	3.27	1.14
	The knowledge and skill necessary to collect a DNA biological traces are available	3.23	1.24
	Tools and materials are available to collect body fluids traces from the crime scene.	3.22	1.12
	DNA analysis and databases are available in Palestine.	3.20	1.23
	The risks associated with handling biological traces are taken into account.	3.45	1.13
	Safety measures in the crime scene are observed.	3.66	1.02
	Overall score for the second field	3.40	1.14
3. Packaging and transportation of the biological traces from the scene of the crime			
	Mark each envelope with a detailed description that includes the evidence.	3.80	1.08
	Ensure that all traces are dry before enveloping to avoid contamination and damage.	3.70	1.01
	Paper envelopes are used to preserve some traces during transportation and storage.	3.70	1.01
	Avoid using iron envelops to avoid rust.	3.66	1.02
	Traces are packed with inner and outer envelopes and the container is sealed.	3.65	1.04
	There are special procedures in packaging, transportation and storage	3.64	1.06
	The container shall be closed in such a way to indicate damage or alteration if opened.	3.64	1.04
	Biological traces are packed in clean and unused boxes if submitted for analysis.	3.61	1.09

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	For the safety of the traces, packaging is done using boxes or tubes, with ventilation.	3.60	1.06
	The type of containers should be considered during the packaging, and transportation	3.60	1.06
	Plastic packaging is avoided as inner envelopes.	3.58	1.03
	Special boxes are used to preserve some kind of traces during transportation	3.56	1.05
	Refrigeration methods are used to preserve some traces during transportation	3.38	1.11
Overall score for the third field		3.62	1.11
Overall score for all fields		3.57	1.07

in dealing with chemical traces, body fluids traces, DNA biological traces and DNA analysis at the crime scene were the most relatively less experiences from the PPA employees point of view (Table 2).While the first and the third sections "searching and documentation of the crime scene", and "packaging and transportation of the biological traces from the scene of the crime", the total averages were (3.69) and (3.62) respectively.Results also show in these two sections that all paragraphs' average were more than (3.5) except paragraph number (34) about the refrigeration methods are used to preserve some traces during transportation and storage, the average was (3.38) (Table 2).

Data Analysis of the Studied Sociodemographic Profile

The study's participants' responses were examined based on their demographic information, including their age, educational background, position, duration of employment with the PPA, and site of employment; the results are shown in tables (3-7).

It is clear from (Table 3), that there is a significant difference (P < 0.05) among the averages of the responses according to the age variable. It was found that the average of thecategory from (46 -60) years oldwas the least agree with the experiences of PPA employees in technical procedures followed at crime scene with average of (3.17) compering to other categories.

It is clear from the results that the significance level is greater than (P = 0.05), so there are no statistically significant differences between the averages of the responses of PPA employees according to the study level variable. In the three fields of technical procedures at crime scenes and in the overall field (Table 4).

It was found that there is a significant difference (P <0.05) between the responses of PPA employees towards the experiencesin the fields of collection and preservation of the biological traces from the scene of the crime, and in the overall fieldof technical procedures at crime scenes due to the employeerank variable. The highest averages were for the higher ranks and the lowest for the lower ranks (Table5).

It is clear from (Table 6) that the results support the hypothesis that there is no significant differences (P < 0.05) between the averages of PPA officer's responses according to number of serving years in the all fields of technical procedures used at crime scene.

It is clear from (Table 7), that there is a significant difference (P < 0.05) among the averages of the responses in the fields of searching and documentation of the crime scene, and packaging and transportation of the biological traces from the scene of the crimeaccording to the workplace variable. It was found that the average of the responses fromRamallahgovernorate was the least experiences compering to responses from Jenin and Hebron districts.

Table 3: Average, standard deviations (SD) and ANOVA analysis of technical treatments followed at the scene of the crime from PPA employeesaccording to age.

Field	Age/year	N	Average	SD	F	(Sig)*
Searching and documentation of the crime scene	Less than 25	30	3.66	0.69	5.163	0.002
	From 25 to 35	93	3.67	0.8		
	From 36 to 45	86	3.88	0.71		
	From 46 to 60	35	3.29	0.85		
Collection and preservation of thebiological traces from the scene of the crime	Less than 25	30	3.53	0.75	4.67	0.003
	From 25 to 35	93	3.57	0.78		
	From 36 to 45	86	3.6	0.78		
	From 46 to 60	35	3.06	0.65		
Packaging and transportation of the biological traces from the scene of the crime	Less than 25	30	3.78	0.82	4.384	0.005
	From 25 to 35	93	3.67	0.82		
	From 36 to 45	86	3.71	0.85		
	From 46 to 60	35	3.17	0.76		
Total	Less than 25	30	3.66	0.75	5.332	0.001
	From 25 to 35	93	3.64	0.8		
	From 36 to 45	86	3.73	0.78		
	From 46 to 60	35	3.17	0.75		

* Statistically significant at p < 0.05, degrees of freedom (df) = 244.

Table 4: Averages, SD and ANOVA analysis of technical treatments followed at the scene of the from PPA employeesaccording to academic level.

Field	Academic level	N	Average	SD	F	(Sig)
Searching and documentation of the crime scene	Until high school	65	3.83	0.88	1.182	0.317
	Diploma for two years	47	3.7	0.71		
	Undergraduate	117	3.62	0.77		
	Postgraduate	15	3.56	0.59		
Collection and preservation of the biological traces from the scene of the crime	Until high school	65	3.65	0.82	1.611	0.187
	Diploma for two years	47	3.57	0.72		
	Undergraduate	117	3.41	0.79		
	Postgraduate	15	3.39	0.61		
Packaging and transportation of the biological traces from the scene of the crime	Until high school	65	3.79	0.85	1.161	0.325
	Diploma for two years	47	3.6	0.9		
	Undergraduate	117	3.55	0.81		
	Postgraduate	15	3.6	0.79		
Total	Until high school	65	3.76	0.85	1.578	0.195
	Diploma for two years	47	3.62	0.78		
	Undergraduate	117	3.53	0.79		
	Postgraduate	15	3.52	0.67		

* Significant at p < 0.05, df = 244.

Discussion

The main purpose of this study is to highlight the PPA employees experiences in technical procedures related to the biological forensic traces at the crime scene.

The findings of this study demonstrated that the level of overall experience of participants regarding CSI was adequate, as the average for all paragraphs was (3.57). Although,The participants in this study claimed that they have good and sufficient experiences in searching and documentation of the crime scene procedures, and the packaging and transportation of the biological evidence from the crime scene with the total averages of (3.69) and (3.62) respectively. However, the collection and preservation of biological evidence especially DNA

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Table 5: Averages, SD and ANOVA analysis of technical treatments followed at the scene of the from PPA employeesaccording to rank.

Field	Rank	N	Average	SD	F	(Sig)*
Searching and documentation of the crime scene	Non-commissioned officer	29	3.86	0.80	1.87	0.135
	From lieutenant to captain	129	3.67	0.75		
	From captain to colonel	74	3.73	0.83		
	Colonel and above	12	3.24	0.68		
Collection and preservation of the biological traces from the scene of the crime	Non-commissioned officer	29	3.89	0.76	2.26	0.046*
	From lieutenant to captain	129	3.45	0.8		
	From captain to colonel	74	3.51	0.76		
	Colonel and above	12	3.21	0.53		
Packaging and transportation of the biological traces from the scene of the crime	Non-commissioned officer	29	3.91	0.87	2.09	0.102
	From lieutenant to captain	129	3.57	0.87		
	From captain to colonel	74	3.67	0.77		
	Colonel and above	12	3.28	0.72		
Total	Non-commissioned officer	29	3.89	0.81	2.31	0.044*
	From lieutenant to captain	129	3.56	0.81		
	From captain to colonel	74	3.63	0.79		
	Colonel and above	12	3.25	0.64		

* Significant at p < 0.05, df = 244.

Table 6:Averages, SD and ANOVA analysis of technical procedures followed at the scene of the crime from PPA employeesaccording to service period.

Field	Service at PPA	N	Average	SD	F	(Sig)
Searching and documentation of the crime scene	Less than 6	47	3.64	0.82	0.184	0.907
	From 6 to 11	36	3.75	0.74		
	From 11 to 16	54	3.73	0.72		
	More than 16	107	3.67	0.82		
Collection and preservation of the biological traces from the scene of the crime	Less than 6	47	3.47	0.89	0.590	0.622
	From 6 to 11	36	3.64	0.73		
	From 11 to 16	54	3.54	0.76		
	More than 16	107	3.45	0.75		
Packaging and transportation of the biological traces from the scene of the crime	Less than 6	47	3.66	0.89	0.612	0.608
	From 6 to 11	36	3.68	0.84		
	From 11 to 16	54	3.71	0.77		
	More than 16	107	3.54	0.85		
Total	Less than 6	47	3.59	0.87	0.494	0.687
	From 6 to 11	36	3.69	0.77		
	From 11 to 16	54	3.66	0.75		
	More than 16	107	3.56	0.81		

Table 7:Averages, SD and ANOVA analysis of technical treatments followed at the scene of the crime from PPA employeesaccording to workplace.

Field	Department	N	Average	SD	F	(Sig)*
Searching and documentation of the crime scene	Hebron	72	3.76	0.82	7.92	0.00*
	Jenin	82	3.9	0.64		
	Ramallah	90	3.45	0.81		
Collection and preservation of the biological traces from the scene of the crime	Hebron	72	3.6	0.83	0.77	0.47
	Jenin	82	3.44	0.85		
	Ramallah	90	3.49	0.66		
Packaging and transportation of the biological traces from the scene of the crime	Hebron	72	3.65	0.93	3.30	0.04*
	Jenin	82	3.78	0.84		
	Ramallah	90	3.46	0.73		
Total	Hebron	72	3.67	0.861	1.45	0.24
	Jenin	82	3.71	0.777		
	Ramallah	90	3.46	0.733		

* Significant at p < 0.05, df = 244.

sources from the crime scene were relatively insufficient. This is consistent with knowledge that gives specificity to the circumstances of collecting and preserving biological evidence at crime scenes [8, 15]. DNA analysis laboratories were recently established in Palestine, and efforts are still being made to rehabilitate the laboratories with the necessary equipment and train experts on dealing with biological evidence for the purpose of DNA analysis. While other laboratories, such as fingerprints, forgery, ballistic, and some chemical analyses, have been in existence since 2016 and their staff have been subjected to adequate courses and training.

In a previous study conducted by the authors of this research, in order to identify the challenges facing PPA employees serving in the crime scene. They concluded that there are many challenges facing Palestinian police officers while managing crime scenes,and clearly indicate that the legal, administrative, security issues, the need of equipment and training were the highest challenges. In addition to the Israeli occupation, which hinders the movement of officers in the scene of crime [21].

The results of this study demonstrated that the distribution of participants according to the governorate where they work is consistent with the real numbers of CSI employee in each district. The results show that most of the officers working at the crime scene are young(25-45) years old, holdingundergraduate degrees, and rank from lieutenant to captain (Table 1).This distribution is mirroring that of officers in all Palestinian security forces[22].

It is also clear from the results of this study that the most of police officers'age ranging from (25) to (45) years old. This is due to several reasons, including the recent formation of the Palestinian security services, including the PPA, about (30) years ago. Therefore, most of those affiliated with the security services, especially the police agency, are still young. In addition, a large number of employees in the security services have been referred to retirement. These reasons also explain the high percentage (43.8) of study sample members with more than (15)service period in the PPA(Table1). The results show that a high percentage reached(53%) of respondents work at the rank of lieutenant to captain in the PPA. This is in contrast to the fact that the PPA recently moved towards recruiting new members, who studied and graduated from the Police Academy in Egypt and some of whom

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graduated from Al Istiqlal University in Palestine, which recently established a new department specializing in forensic science[13].It is also clear from (Table 1) that the number of police officers who hold anundergraduate's degree is higher, as their percent in the study sample reached (48%), compared to those who hold a diploma or postgraduate degree. This is due to two reasons, that the majority of the new recruits to the police force in the officer category are graduates of police colleges that grant their graduates anundergraduate's degree in law and police sciences. In addition to the motivation towards the study level rising within the general mood of police salaries as it distinguishes them positively. Therefore, the recruits seek to complete their education and obtain anundergraduate's degree. also as a result of the lack of job opportunities in fields that depend on academic degrees, which provides an increased turnout of certificate holders to join the ranks of the police, as well as the motivation of personnel for promotion. as well as the fact that the administrative authorities do not usually oppose completing the educational path for their affiliates, and this instead of the general Palestinian social mood who honors holders of academic degrees [21].

Conclusion

For the first time, PPA employees' experiences in CSI processing have been assessed successfully in Ramallah, Jenin and Hebron governorates in Palestine. Various technical procedures such as preservation, documentation, collection, packaging and transportation of biological traces from the scene of thecrime were estimated to assess the experiences of PPA employees in other governorates in the West Bank, Palestine.

The mean of the respondents' experiences in studied CSI procedures were (3.57). Which clearly indicates that PPA officers at crime scenes, in general handle forensic evidence well. However, there is a weakness in the preservation and collection of biological evidence, especially DNA sources traces. In addition, there was a significant difference between the respondents regarding to the serving governorate, rank and age.

Focusing on training crime scene investigators from PPA on dealing with forensic evidence, especially biological evidencefor all officers and individuals from all Palestinian governorates in which they serve were recommended. This research holds significance in raising awareness and knowledge about dealing with biological evidence at crime scenes among PPA employee, and the results can serve as a reference point for future studies.Additionally, Future studies will delve deeper into the nature of the questions used in the study tool, along with conducting interviews with those involved in dealing with crime scenes in Palestine. In addition, expanding the study region to include all Palestinian governorates were recommended.

Conflicts of interest

The authors declare no conflicts of interest.

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