

The Human Suffering caused by bomb containing White Phosphorus: Health Effects

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ABSTRACT

Background: White phosphorus cause injuries and bereavement by burning human body, by being inhaled the smoke or body exposed to burning material.

Aim: To find out the Human Suffering caused by bomb containing White Phosphorus: Health effects

Methodology: An Exploratory Surveys (case control study) was carried out on people who exposed to bomb blasts (white phosphorous) and shooting happened in a market of Lahore. Data was collected from 100 consented victims residing in the terrorism-affected area. The detail of personal data and health effects was recorded in a Proforma. A chi-squared test showed the differences in complains of victims on exposure.

Results: Of the one hundred patients majority was male with age < 30 years and were exposed to explosion in open air space. The highest odds of feeling generalized weakness, susceptibility to fatigue was observed followed by psychological trauma, Insomnia in initial days, scared to dark and scared to close door was noted. Other complains of victims were ear drum rupture, with highest odds and it was followed by head injuries, brain injuries, head injuries causes blindness and hair loss due to shelling.

Conclusion: In populated placed heavy explosive weaponries increase the risk of personal and emotional harm to general people.

Key Words: Bomb Blast, psychological and respiratory problem, ear drum rupture.

INTRODUCTION

Blast injuries are very important issue especially when their influence on civilian due to bombing of terrorist. With increasing power of destruction, not only military people but civilian are also face fatal and non-fatal casualties¹ as energy released from bomb blast result different types of penetrating radiation². Moderate to severe damage is observed in most buildings when subjected to overpressures. Most of the material damage is caused by a combination of the high static overpressures and the blast winds^{3,4}.

Blast injuries are based on primary, secondary and tertiary, and quaternary types. Primary blast injuries may include the effects of shock waves which move through the tissues of body and cause damage especially the lung. Secondary blast injuries debris and fragments energized by the blast that hit with human body and causes penetrating form of injuries. Tertiary form of blast injuries is the condition in which living body being hurt or thrown against barrier by blast wind causing blunt type injuries. On the other hand quaternary forms of injuries are multiple types of injuries including crush and burns from distorted building etc⁵.

Various weapons including white phosphorus is a multipurpose grenade used for gesturing and inflammation; it may cause deep burns of smaller area with high degree of morbidity⁶. The injuries and death due to white phosphorus may be three ways: Burning deeply into tissue, inhalation of smoke or ingestion of white phosphorous. Phosphorus burns may increase the risk of death or deep due to phosphorous absorption in human body via area of burns causing the damage of heart, liver and kidney some time the reason of failure of various organs⁷. Additionally the smoke of white phosphorous annoys the eyes, membranous area of the respiratory tract and in small amount, while large amount may be the reason of deep burns⁸.

Burn injuries, among civilians, are usually trauma which are highly extensive, profounder, more complicated, and undertreated, in comparison with normal case of accidental burn in routine⁹. Moreover, burn sufferers often show symptoms that can slow the

recovery, triggering severe impairment in long-term, psychological and physical. Psychiatric issues often seen in burn subjects are post-traumatic stress disorder (PTSD), depression and considered by a reaction of fear during the trauma and ensuing intrusions, dodging, and hyperarousal. The incidence rate of PTSD among burn people is 9 to 35% at 2 - 4 months after the burn wound¹⁰.

Bomb blast injuries to inhabitants have become increasingly known due to terrorism. It is vital for medical professionals to be familiar in the variety of injuries that are related with mass. As the explosions are infrequent, blast-linked injuries show typical triage, investigative, and management tasks to providers of extra care. In addition the psychosocial impact on the civilians and the interventions for their retrieval in a major issue addressed by this study.

This study was planned to find out the Human Suffering caused by bomb containing White Phosphorus: Health effects

METHODOLOGY

An Exploratory Surveys (case control study) was carried out on people who exposed to bomb blasts (white phosphorous) and happened in a market of Lahore. Majority of the sufferers were females. Data was collected from 100 consented victims residing in the terrorism-affected area. Duration of study was two months. Sampling technique is probability (random) sampling. Individuals who have already skin problems, pulmonary disease, eye and ear related problems were excluded from the study.

Table 1: Demographic characteristics of victims

Characteristics	Frequency	Relative Frequency
Men	60	60%
Women	40	40%
≤ 30 yrs of age	45	45 %
>30 yrs of age	55	55 %
Victims distance from the explosion site		
< 15 m	35	35 %
≥15 m	65	65 %
Open air victim	60	
Close space victim	40	

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Victims who have extensive injuries like burns, penetrating wounds from shrapnel, blunt wounds from tumbling debris, lung damage, from blast pressure and harm to eye / ears were included in the study. Personal data and health effects were noted using Proforma. Statistical analysis: Data was analyzed by SPSS 20. Demographic characteristics of victims were expressed as

frequency and relative frequency. Categorical variables including general complains and other problem related with eye, ear, skin etc of victims were expressed as percentages, odd ratio with 95% CI by using chi-square test. P value < 0.05 is taken as significant.

Table 2: General complains of victims:

Complains	n	% ages	Odd ratio	95.0 % CI	P - value
Generalized weakness	Yes---98	98	2401	17388.06	P<0.001
	No---02	02			
Susceptibility to fatigue	Yes---98	98	2401	17388.06	P<0.001
	No---02	02			
Impenitence of mental work	Yes---20	20 %	0.06	0.125	P<0.001
	No---80	80 %			
Psychological trauma	Yes---90	90 %	81.00	204.0	P<0.001
	No---02	02%			
Insomnia in initial days	Yes---80	80 %	16.0	31.99	P<0.001
	No---20	20 %			
Insomnia after 2-3 weeks	Yes---15	15 %	0.03	0.06	P<0.001
	No---85	85 %			
Scared to noise and darkness—	Yes---70	70 %	5.44	9.96	P<0.001
	No---30	30 %			
Scared to close doors	Yes---20	20 %	0.06	0.12	P<0.001
	No---80	80 %			

Table 3: Other problems of victims

Problems	N	Percentages	Odd ratio	95% confidence Interval	P value
Ear drum rupture	Yes ---60	60 %	2.25	3.96	<0.005
	No---40	40%			
Head injuries	Yes ---10	10 %	0.012	0.031	<0.001
	No---90	90 %			
Head injuries causes blindness	Yes ---01	01 %	0.001	0.017	<0.001
	No---99	99 %			
Hair loss due to shelling	Yes ---01	01 %	0.001	0.017	<0.001
	No---99	99 %			
Burn injuries (full site of any part of the body or burn on back, hand and foot) recover after 2-3 weeks	Yes---10	10 %	0.012	0.031	<0.001
	No---90	90 %			

Table 4: Disorders not recorded

Urinary complains
Hemorrhagic tendency
Hematological disorders
Cardiovascular disorders
Respiratory disorders

RESULTS

Demographic characteristics of victims are tabulated as table 1. Of the one hundred patients, 60 (60%) were male and 40 (40 %) were female. Besides, 45 (45 %) subjects were aged < 30 years and 55 (55%) were aged greater than thirty years. Also, 35 (35 %) subjects were far from explosion site at a distance of < 15 meter. Additionally 60(60%) subjects were effective due to explosive material in open air.

Complains of the 100 victims of Bomb blast is tabulated (Table 2). There was substantial difference in complains of victims. The odds of feeling generalized weakness, Susceptibility to fatigue was 2401 (95 % CI 17388). The odds of Psychological trauma, Insomnia in initial days were 81 and 16 (95 % CI 204 & 31.99). On the other hand the odds of insomnia after 2-3 days, scared to noise and darkness was 5.44 (95 % CI 95.6) noted. Besides scared to close door was 0.03 & 0.06 (95 % CI 0.06 & 0.12).

Other complains of victims are given table 3. The odds of ear drum rupture were 2.25 (95 % CI 3.96). Whereas the odds of head injuries and burn injuries 0.012 (95 % CI 0.031). on the other hand the odds of head injuries causes blindness and hair loss due to shelling was 0.001 (95 % CI 0.017) was noted.

DISCUSSION

Bomb blast injuries in civilians due to terrorism are increasing worldwide. Surviving victims are paying a terrible cost and are left

with severe mutilations and handicaps from burns and wounds all over the body¹.

Complains of the victims of Bomb blast include generalized weakness and susceptibility to fatigue with very high odd ratio followed by the problems of psychological trauma, insomnia in initial days and frightened to darkness and noises. Additionally, some effective people afraid to doors crash and have heartless of mental work.

Number of studies carried out in China, Paris, Japan, South Korea, Myanma, Netherland and others reported a direct relationship between explosive weapons and emotional harm¹². Study carried out in Baluchistan and Khyber Pakhtonistan is demonstrated that War, fight, and terrorism are very throbbing and shocking occasions that not only affect the daily routine of people but also a factor of physiological and psychological problems. Such incident of terrorism produce lack of confidence among humanities that ultimately becomes the reason of fear, depression, fear, anxiety and psychological problems^{13,14}. The terror of terrorism and many psychological conditions also observed in people of United State like their level of depression, insomnia and problems related to mental health¹⁵. According to a study carried out on French people, a high incidence of Post-Traumatic Stress Disorder and other psychiatric disarray was observed in the victims. Moreover, these awful events of terrorism may affect the ability of victim to manage their normal routine of life¹⁶.

It is reported that an explosion is a unexpected, loud, and tremendously violent incident, and people facing the discharge of an explosive material resulting acute type of stress. According to an American study the high level of fear and distress facing after a bomb blast depends on many factors, including self-injury, death of a friend or close relative and the watching of terrible scenes¹⁷. It is demonstrated that the close relationships affect cognitive, physical and emotional processes in normal routine of life¹⁸. A study carried out in Mexican city stated that main anxiety for human was the loss

of family members, and also destroy or burning of residence. Loss of paternities or family members left both "A-bomb orphans" and "the orphaned elderly"¹⁹.

According to our survey the highest odds of was noted in people who have ear drum rupture followed by head injuries and burn injuries. On the other hand the odds of head injuries causes blindness and hair loss due to shelling was noted in few people.

According to a Pakistani study bomb blast, shock waves cause pressure waves which may damage tissues of different densities especially bone and muscle and rupture ear drum. Lungs and the abdominal cavity due to air pressure are particularly injured²⁰. Lungs is the utmost radiosensitive part of the body, radiation pneumonitis may results and it is related with damage of epithelial cells, blockade of airways/ air sacs, Inflammation & blood vessels¹⁹. Another study carried out in United Kingdom estimated that damage of lungs is usually occur at very high pressure and eardrums would probably rupture low pressure waves produce from bomb blast²¹.

A study on effects of bomb blast carried out in China stated that many eye injuries are mainly due to blast and among these injuries the worst eye injury is open-globe injury²².

Our survey report is in agreement with study carried out in Washington DC who found that skin is more prone to beta-releasing radioactive waves. Study proved that the germinal layer is mainly damage. Erythema is rapidly formed due to congestion of blood vessels and edema in 50.0 % of subjects faces 5.0 to 6.0 gray radiations. Studies reported that further effects due to radiation exposure were hair loss for the time being, enduring epililation, flaking / itching, weeping scorching and ulceration²³.

Limitations: Other disorders like urinary complaints, hemorrhagic tendency, hematological disorder, cardiovascular and respiratory disorders are not recorded properly as the victims may be expired or shifted elsewhere.

CONCLUSION

In populated placed heavy explosive weaponries increase the risk of personal and emotional harm to many people. It is there a need to plan based on Global Shield i.e. a pact among agencies worldwide intended to avert the usage of chemical in blast.

Conflict of interest: Nil

Authors' Contributions: RK: Study design and paper writing, HS: Data collection, HA: Literature search, FH, SS: Data Interpretation, SR: Proof reading

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