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Evaluation of Pressure Ulcer Among the Critically Ill Patients Admitted in a Tertiary Hospital

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Abstract

Background: *All over the world pressure ulcer is a significant health care problem due to high morbidity and mortality rates and also high health care cost. This study was carried out with the objectives to identify the characteristics and associated factors of pressure ulcer among the critically ill patients admitted in a tertiary military hospital. Few studies have been conducted on pressure ulcer in Bangladesh and very few in military hospitals.*

Methodology: *This was a cross sectional study conducted among purposively selected 53 critically ill admitted pressure ulcer patients in CMH Dhaka from 01 July 2018 to 31 December 2018 and data were collected by face to face interview and checklist.*

Results: *Among the study population half (50.9%) were aged between 61-80 years with the mean age 69.13 years. The most common anatomical site of pressure ulcer were buttock (51.9%) followed by sacrum (38.5%) and 30.2% had multiple pressure ulcer. Among the critically ill patients, 81.1% had developed pressure ulcer after admission into hospital. The most common place of pressure ulcer was geriatric HDU (30.2%) and officers ward (18.9%). Among the pressure ulcer patients 79.2% were male. Most common stage of pressure ulcer were stage II (66.0%) followed by stage I (18.9%), stage III (13.2%) and stage IV (1.9%). All of them were bedridden and half (50.9%) were completely immobile. According to Braden Scale, about half (50.9%) had high risk for development of pressure ulcer followed by moderate risk (26.4%) and there were none beyond risk. About three fourth (73.6%) of pressure ulcer patients had hypertension & cerebrovascular diseases. Age group of 60-90 years, SSC & above educational group, male sex, immobility, low Braden score group patients are statistically significant ($p < 0.05$), and hypertensive and cerebrovascular diseased patients are not statically significant ($p > 0.05$) but having clear trends to be associate factors of pressure ulcer.*

Conclusion: *The number of pressure ulcer were increasing with the increase of age. The higher age, male sex, immobilization, low Braden score, hypertension, and cerebrovascular diseased patients were more prone for development of pressure ulcer among the critically ill patients.*

Key word: *Pressure ulcer, Critically ill patients, Bedridden, Immobilization, Braden Scale*

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Introduction

Pressure ulcer are a very common problem for individuals with restricted mobility. Despite the current treatment and prevention attempts, pressure ulcer remains a serious medical problem commonly found among hospitalized individuals[1].

Bony prominences are the most common site for developing pressure ulcer[2]. According to National Pressure Ulcer Advisory Panel, the incidence of pressure ulcer in the USA ranged in acute care settings from 0.4% to 38%, in long term care 2.2% to 23.9%, and in home care 0% to 17%[3]. Pressure ulcer prevalence in hospital ranging in Europe, USA, Canada and Australia are from 8.3% to 25.1%[4]. In the UK, several large multi-center studies showed pressure sore prevalence varies from 6.6% to 18.6%[5]. The incidence of pressure ulcer in Asian countries was considered high ranging from 2.1% to 31.3% in ICU[6].

Approximately 70% of all pressure ulcer occurred in elders. 60% of pressure ulcer are developed in the acute care setting usually within the first two weeks of hospitalization and 15% of elderly patients will develop pressure ulcers within the first week of hospitalization[7].1

Several adverse effects such as increased mortality, increased risk of infection, delayed wound healing, increased use of hospital resources, increased patient

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care costs, increased patients' length of hospital stay, pain and suffering and lowered quality of life are caused by pressure ulcers that has been showed in several previous studies.[8]

In the set-up of Combined Military Hospital, Dhaka, among the critically ill admitted patients, still some associated factors are available that contribute to high occurrence of pressure ulcer.

Methods and Materials

Cross sectional study was undertaken to assess the characteristics and associated factors of pressure ulcer among the critically ill patients admitted in Combined Military Hospital, Dhaka. The duration of the study was 06 months, commencing from 01 July 2018 to 31 December 2018. All diagnosed pressure ulcer patients admitted in Critical Care Centre, HDU complex, Neurosurgery, Neuromedicine, Burn and plastic, Orthopedic and Officers ward were included as study population. Within the study period, total 53 critically ill diagnosed pressure ulcer patients have been taken as sample. Patients are confined in bed having state of actual or potential risk of life- threatening health problem are considered as critically ill patients. Damage to the skin and/or deeper tissue by pressure effect which can be seen as diagnosed by physician was taken as pressure ulcer. Purposive sampling technique was adopted. Those who gave informed consent, both sex and those who have developed pressure ulcer are included in the study. Unwilling and psychologically abnormal patients are excluded from the study. A semi-structured questionnaire was prepared to collect necessary information. A checklist was made to collect information regarding number of pressure ulcer, staging of pressure ulcer, status of dehydration and Braden scale for predicting pressure ulcer risk. The Braden Scale is measured for predicting pressure ulcer risk by using six criteria named sensory perception, moisture, activity, mobility, nutrition and friction & shear. Score 9 or less indicates severe risk, 10-12 indicates high risk, 13-14 indicates moderate risk, 15-18 indicates mild risk and 19-23 indicates no risk. Informed consent was taken after explaining the purpose of the study to the respondents. As per selection criteria of the study, data collection was carried out by the researcher through face to face interview by asking question in Bangla.

Results:

Socio-demographic characteristics

Out of 53-study population, majority 27 (50.9%) were in the age group of 61-80 years followed by 12 (22.6%) study population were in 81-100 years of age group. The mean age of the study population were 69.13 years with standard deviation ±17.587 years. Among them male were 42 (79.2%) and 11 (20.8%) were female, all (100%) were Muslim (Table I).

Table-I

Socio-demographic characteristics of the study population. (n=53)

Characteristics	Categories	Frequency	Percentage
	20-40	5	9.4
	41-60	8	15.1
Age in years	61-80	27	50.9
	81-100	12	22.6
	e"101	1	1.9
Sex	Male	42	79.2
	Female	11	20.8
Educational status	Illiterate	2	3.8
	Primary	3	7.5
	Secondary	13	24.5
	SSC	12	22.6
	HSC	6	11.3
	Degree or above	16	30.2
Marital status	Married	45	84.9
	Widow	4	7.5
	Widower	2	3.8
	Single	2	3.8

Majority 29 (54.7%) of study population were retired followed by 11 (20.8%) of study population were housewife. Among them 6 (11.3%) were serving personnel, 4 (7.5%) were farmer and 3 (5.7%) were businessman (Figure I).

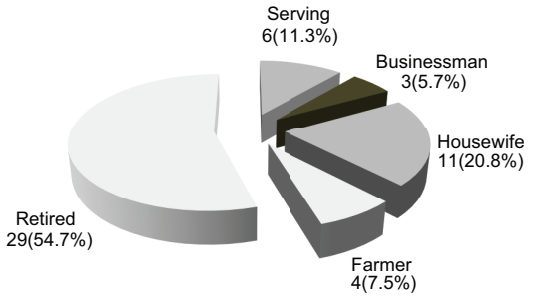

Fig.-1: *Pie chart showing the distribution of study population by occupational status (n=53).*

Characteristics of pressure ulcer

Majority 37 (69.8%) had single number of pressure ulcer followed by 13 (24.5%) had 2 pressure ulcers where 3 (5.7%) had 3 or more pressure ulcer. 27 (51.9%) of study population had developed pressure ulcer on buttock followed by 20 (38.5%) had developed pressure ulcer on sacrum and 43 (81.1%) had developed pressure ulcer after admission. Majority 16 (30.2%) were admitted in geriatric HDU ward followed by 10 (18.9%) were admitted in officers ward (Table II).

Table II

Distribution of study population by characteristics of pressure ulcer (n=53)

Characteristics	Categories	Frequency	Percentage
Number of pressure	1	37	69.8
ulcer	2	13	24.5
	≥3	3	5.7
Location (Skin	Ischial	27	51.9
overlying)	Pre-sacral	20	38.5
	Back of Thigh	11	21.2
	Elbow	1	1.9
	Shoulder	1	1.9
	Back	3	5.8
	Ankle	2	3.8
Time of	Before admission	10	18.9
development	After admission	43	81.1
Admitted ward	Critical Care Centre	5	9.4
	Geriatric HDU	16	30.2
	Medical HDU	3	5.7
	Surgical HDU	1	1.9
	Burn and plastic	1	1.9
	Neurosurgery	3	5.7
	Neuromedicine	8	15.1
	Orthopedic	6	11.3
	Officers ward	10	18.9

Among the 53-study population maximum 35 (66.0%) of study population belonged to stage II pressure ulcer followed by 10 (18.9%) belonged to stage I where 7 (13.2%) belonged to stage III and rest 1 (1.9%) belonged to stage IV pressure ulcer (Figure 2).

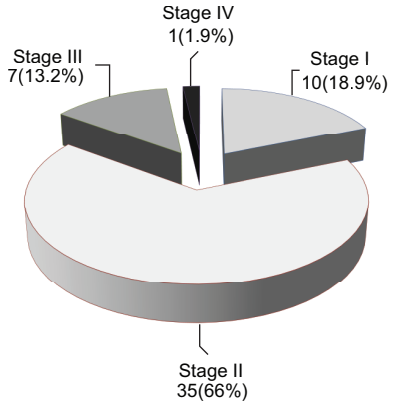

Fig.-2: *Pie chart showing the distribution of study population by stage of pressure ulcer (n=53).*

Associated factors contributing for developing pressure ulcer.

Majority 15 (28.3%) of study population were admitted for d"10 days in hospital followed by 11 (20.8%) were admitted between 11-20 days and 10 (18.9%) were admitted between 21-30 days where mean length of stay were 29.66 days with standard deviation ±34.662 days (Figure 3).

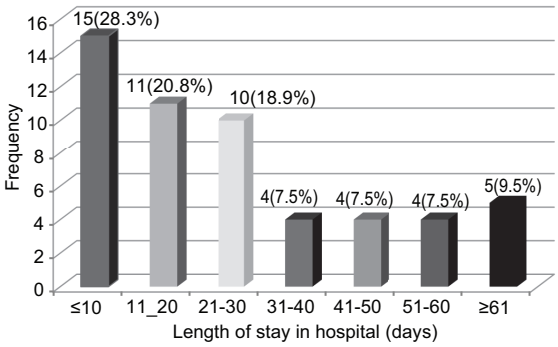

Fig.-3: *Bar chart showing the distribution of study population by length of stay in hospital (n=53).*

In this study various associated factors are observed contributing development of pressure ulcer (Table III).

Table III

Distribution of study population by Associated factors contributing for developing pressure ulcer

Characteristics	Categories	Frequency	Percentage
Status of dehydration	Yes	19	35.8
	No	34	64.2
Current smoking(n=53)	Yes	10	18.9
	No	43	81.1
Use of pressure matrix (n=53)	Yes	48	90.6
	No	5	9.4
Use of diaper(n=53)	Yes	19	35.8
	No	34	64.2
Posture change(n=53)	Yes	40	75.5
	No	13	24.5
Duration of posture change (hours)(n=40)	1-2	32	80.0
	3-4	4	10.0
	5-6	1	2.5
	≥7	3	7.5
	Total	40	100.0
	Mean±SD=2.15±3.718 hours		
Linen change(n=53)	Yes	51	96.2
	No	2	3.8
Duration of linen change (hours)(n=51)	1-24	33	64.7
	25-48	16	31.4
	e”49	2	3.9
	Total	51	100.0
	Mean±SD=32.38±18.318 hours		
Dressing(n=53)	Yes	39	73.6
	No	14	26.4
Duration of dressing (hours)(n=39)	1-4	2	5.12
	5-8	8	20.51
	9-12	4	10.25
	≥13	25	64.10
	Total	39	100.0
	Mean±SD=14.02±11.456 hours		

Maximum 45 (84.9%) were suffered from Hypertension. Other major co-morbidities were Cerebrovascular disease 39 (73.6%), Diabetes 24(45.3%), IHD 16 (30.2%) and Pneumonia 12 (22.6%) (Table IV).

Table -IV

Distribution of study population by morbidity status

Morbidity type	Frequency	Percentage
Diabetes	24	45.3
CVD	39	73.6
After prolong surgery	6	11.3
Bronchial asthma	12	22.6
Parkinson's disease	11	20.8
Hypertension	45	84.9
Pneumonia	12	22.6
Fracture of Hip or Femur	8	15.1
Ischemic heart disease	16	30.2
Fracture of any other bone	5	9.4
Cancer	3	5.7
Multi organ dysfunction	11	20.8
Kidney injury	9	17.0
Electrolyte imbalance	10	18.9
Dementia	3	5.7
Burn	1	1.9

Note: Due to multiple response the total percentage is more than 100%.

Assessment of the severity of risk for developing pressure ulcer (Braden Scale)

According to Braden scale, maximum 25 (47.2%) had slightly limited sensory perception and 30 (56.6%) belonged to occasionally moist group. All 53 (100.0%) respondents were bedfast. Majority 27 (50.9%) were completely immobile, 35 (66%) had adequate nutrition and 30 (56.6%) had problem with friction and shear (Table V).

Among the 53- study population majority 27 (50.9%) had high risk for development of pressure ulcer followed by 14 (26.4%) had moderate risk for developing pressure ulcer and there was not a single study population who had no risk for developing pressure ulcer (Figure IV). Mean Braden score was 12.25 with standard deviation ±2.028.

Table V

Distribution of study population by Braden Scale

Characteristics	Categories	Frequency	Percentage
Sensory	Completely limited	00	00
perception	Very limited	14	26.4
	Slightly limited	25	47.2
	No impairment	14	26.4
Moisture	Constantly moisture	2	3.8
	Often moisture	21	39.6
	Occasionally moisture	30	56.6
	Rarely moist	00	00
Activity	Bed fast	53	100.0
	Chair fast	00	00.0
	Walks occasionally	00	00.0
	Walks frequently	00	00.0
Mobility	Completely immobile	27	50.9
	Very limited	20	37.7
	Slightly limited	6	11.3
Nutritional	Very poor	1	1.9
status	Probably inadequate	17	32.1
	Adequate	35	66.0
	Excellent	00	00
Friction and	Problem	30	56.6
shear	Potential problem	22	41.5
	No apparent problem	1	1.9

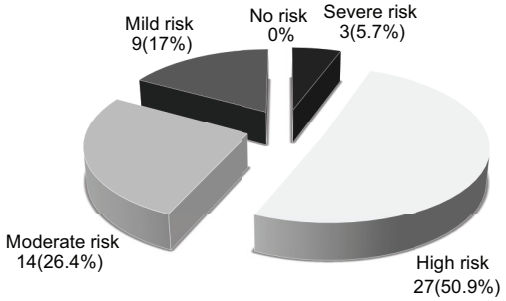

Fig.-4: *Pie chart showing distribution of study population by risk of development of pressure ulcer (n=53).*

In statistical analysis, age group of 60-90 years, SSC & above educational group, male sex, immobility, low Braden score group patients are statistically significant ($p < 0.05$), and hypertensive and cerebrovascular diseased patients are not statically significant ($p > 0.05$) to develop pressure ulcer (Table VI).

Table VI

Statistical significance of different associated factors

Age	**After admission**			**Before admission**			P=0.03
Less 60	12			7			
60-90	30			4			
Educational status	**No of Pressure Ulcer (1-2)**			**No of Pressure Ulcer (3-5)**			P=0.003
Upto secondary	13			6			
SSC and above	33			1			
Sex (Place of admission)	**Critical CareCentre No (%)**	**HDU No (%)**	**Neuro-surgery No (%)**	**Neuro-medicine No (%)**	**Ortho-pedic No (%)**	**Officers ward No (%)**	P=0.009
Male	3(5.7)	12(22.6)	3(5.7)	8(15.1)	6(11.3)	10(18.9)	
Female	2(3.8)	8(15.1)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	
Mobility		**Frequency**			**Percentage**		P=0.041
Completely immobile/ Very limited		47			88.7		
Slightly limited		6			11.3		
Braden Scale		**Frequency**			**Percentage**		P=0.043
Severe to High Risk		30			56.6		
Mild to Moderate Risk		23			43.4		

Morbidity	**Hyperten-sion**	**CVD**	**Diabetes**	**IHD**	**Bronchial Asthma/ Pneum-onia**	**Multi-organ dysfunction/ Parkinson's Dis**	**Other**	P=0.051
Frequency	45	39	24	16	12	11	1-10	
Percentage	84.9	73.6	45.3	30.2	22.6	20.8	1.9- 18.9	

Discussion:

In the present study it was found that about half (50.9%) of the study population were in the age group 61-80 years. The mean age of the study population were 69.13 years. This study findings were almost similar to the study findings conducted by Banjar et al in Jeddah, Saudi Arabia where it was found that 60% of the study population had developed pressure ulcer between the age 60-90 years[9]. The study findings were not similar to the study findings conducted by Amin et al in Bangladesh where it was found that 41.2% of study population had developed pressure ulcer between the age 21-40 years[10]. A study conducted by Zhou et al in china where majority (37.7%) had developed pressure ulcer between age 40-60 years[11]. This study findings were not similar to the present study findings due to defense persons were less prone to develop pressure ulcer in early age due to their physical fitness in service period.

As per sex distribution among the study population it was revealed that about four fifth (79.2%) of study population were male and one fifth (20.8%) were female which is almost similar to the study findings conducted by Amin et al in Bangladesh (77.2% were male and 22.8% were female and Arsh et al (2016) in Pakistan (77.8% were male and 22.2% were female)[10,12].

In the present study it was seen that majority (69.8%) had developed one pressure ulcer followed by 24.5% had developed 2 pressure ulcer and 5.7% had developed 3 or more pressure ulcer. Among the study population majority 12 (22.6%) of study population of SSC or equivalent had single number of pressure ulcer followed by 11 (20.8%) study population of degree and above had single number of pressure ulcer. The association between number of pressure ulcer and educational status was found statistically significant (p=0.046) which is nearly similar to study conducted by Baumgarten et al in USA[13].

In the present study it was evident that 51.9% and 38.5% of study population had developed pressure ulcer skin overlying in ischial and pre-sacral respectively. This study findings were dissimilar to the study findings conducted by Sharmila et al Bangladesh and Arsh et al in Pakista may be due to frequent change of posture of

the present study population. Further study may be required to find out the cause of difference[14,12].

In the present study it was revealed that two third (66.0%) of study population had stage II pressure ulcer followed by 18.9% had stage I pressure ulcer which were not similar to the study findings conducted by Baumgarten et al in USA[13] and Bernardes et al[15]. Further in-depth study is required to find out the cause of dissimilarity[14,12].

Among all one fourth (28.3%) of study population were admitted for d"10 days in hospital followed by 20.8% were admitted between 10-20 days where mean duration of stay 29.66 days. This study findings were dissimilar to the study findings conducted Banjar et al in Saudi Arabia where it was found that majority 62.5% were stayed in hospital for 5-10 days[9]. Further study may be required to find out the cause of difference.

This study revealed that more than three fourth (84.9%) % of study population had hypertension, 73.6% had cerebrovascular disease, 45.3% had diabetes, 22.6% had asthma which were not similar to the study findings conducted by Margolis et al conducted in USA[16]. Again, this dissimilarity can be address in future study to find out the cause.

In the present study it was found that about half (50.9%) of study population had high risk for developing pressure ulcer followed by 26.4% of study population had moderate risk for developing pressure ulcer. The present study findings were not similar to the study findings conducted by Zhou et al in China where it was found that majority79.7% had no risk for development of pressure ulcer followed by 11.8% had low risk for development of pressure ulcer[11]. On the other hand, this study findings were more or less similar to the study findings by Karahan et al and Akca et al conducted in Turkey[17,18]. Being a present cross-sectional study, this similarity/dissimilarity appears to be beyond the scope of explanation. We may expect future study to explain those things.

In statistical analysis, we found higher age group, SSC & above educational group, male sex, immobility, low Braden score group patients are statistically significant ($p < 0.05$), and hypertensive and cerebrovascular diseased patients are not statically significant ($P > 0.05$) but having clear trends to be associate factors to develop pressure ulcer.

Finally, as this study has limitation of being short duration single centered with small sample size, further large size multicentered study is required to confirm the study findings.

Conclusion:

In a tertiary level military hospital like CMH Dhaka higher age group, male sex, immobilization, low Braden score, hypertensive and cerebrovascular diseased patients were more prone for development of pressure ulcer among the critically ill patients. Pressure ulcers are a serious issue for patients in all kinds of settings. In the light of this study findings, it is told that early detection of pressure ulcer should be a part of initial management of patients those who are critically ill.

Recommendations:

1. Measures should be taken for prevention of pressure ulcer specially among higher aged group (61-80 years).
2. Special preventive care should be taken for the pressure ulcer patients admitted in geriatric unit of HDU and officers ward specially after admission into hospital.
3. Health awareness programme/Counseling and deliberate/comprehensive pressure ulcer prevention programme should be taken among the critically ill patients who are bed ridden with special attention to male patients.
4. Regular posture should be changed to all patients who are unable to move.
5. Patient's as well as caregiver education regarding management & prevention of pressure ulcer has significant role. So it should be given priority.

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