Effect of Educational Guidelines on Lifestyle and Clinical Outcomes for Patients with Chest Trauma

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Abstract

Chest trauma is a major cause of morbidity and mortality that causes complications and long term, massive effects on patients' daily lifestyle. Educational guidelines are aimed to expand knowledge concerning chest trauma, raise awareness of potential benefit of understanding healthy lifestyle, promote self-care practices, and improve clinical outcomes. The aim of this study was to evaluate the effect of educational guidelines on lifestyle and clinical outcomes for patients with chest trauma. A quasi-experimental research design was used. The study was conducted in outpatient chest clinic and cardio thoracic department in accidental hospital at Zagazig University Hospitals. purposive sample of 50 adult patients with chest trauma. **Tools:** Three tools were utilized for data collection, pertinent as follow: Structured interview questionnaire, Lifestyle Indicator questionnaire, Patient' outcomes assessment questionnaire. He results rrevealed that, nearly three quarters of the studied patients (72.0%) were males, with age ranged from 25-≥45 with Mean ± SD 38.24±12.02, three fifth of the studied patients (60.0%) were educated. Total patient's lifestyle indicator in post guideline (82.0%) had healthy lifestyle. There were highly statistically significant improvements in patients' lifestyle and good outcome after implementing the guidelines. The educational guidelines had a positive effect on improving outcomes and lifestyle for patients with chest trauma through the enhancement of their knowledge. **Recommendations:** Regular follow-up for all patients with chest trauma to evaluate their health conditions, detect the complications early and improve their lifestyle.

Keywords: Chest trauma, Clinical outcomes, educational guidelines, and Lifestyle.

1. Introduction

Chest trauma is a common cause of mortality and major morbidity, and the leading cause of death from physical trauma after head and spinal cord injury, underscores the critical significance of initial management in these cases. It is the primary reason for death in twenty five percent of instances with multiple traumas, and the proportion jumps to fifty percent when it is accompanied by further injuries. Notably, 25% of all trauma-related deaths worldwide stem from chest trauma alone [1]. A retrospective cross-sectional study in Tanzania and Egypt revealed that chest (thoracic) trauma carries an overall mortality rate of 15–25%, surpassing that of patients with cardiac or tracheobronchial–oesophageal injuries [2]. There are two types of chest trauma: blunt and penetrating. Automobile accidents are the leading cause of blunt chest trauma. Assaults, blast injuries, falls, and vehicles striking pedestrians were also examples of such reasons. Gunshots and stabbings account for the

majority of penetrating trauma [3]. Chest trauma, ranging from simple rib fractures to severe penetrating injuries affecting vital structures such as the heart or tracheobronchial system, is observed in nearly two-thirds of patients. The existence of concomitant injuries, such as flail chest, lung contusion, broncho-pleural fistula, cardiac tamponade, pneumothorax, haemothorax, and tracheobronchial rupture along with untreated vascular injuries, can contribute to the mortality of chest trauma if not timely managed. It can be divided into different types depending on the location of the injury, including lungs, chest wall, heart, major vessels, and oesophagus. As a result of that, immediate and accurate assessments must be done for patients with potentially life-threatening chest trauma [4]. Chest injuries contribute to 25% of deaths after trauma and survivors can experience long-standing consequences, such as reduced functional capabilities and loss of work and may reduce a patient's quality of life for several months after injury. The most prevalent treatment of severe chest

wall injuries consists of non-operative management via intubation and intermittent positive-pressure ventilation as needed, analgesia, pulmonary toilet, chest tube drainage, and chest physiotherapy [5]. In the general major trauma population, physical injury has been shown to impact on all aspects of quality of life and daily lifestyle [6]. This has resulted in negative changes to physical functioning including ability to sleep, changes in psycho-sexual function and effects on employment, financial status and ability to return to work. Despite these documented sequelae, it is unclear in current clinical practice how blunt thoracic injury specifically impacts on the recovering trauma patient and their health-related quality of life (HRQoL) after discharge from hospital [7]. Moreover, lifestyle changes should modify things that we have control over and involves factors that may bring on symptoms or make them worse, such as usual daily activities or changes in daily routine. Some lifestyle changes can be taken to help in managing patient with chest trauma as stop smoking which is the top priority in preventing infection and focus on restoring physical activities and promote sleep [8]. Increasing patients' physical and mental function through lifestyle changes is the most important part of treating chest trauma. When a person is aware of the positive effect a healthy lifestyle has on an illness and its complications, they are more likely to engage in healthy habits. Today, education is one of the most important elements of health care. Healthcare education and promotion emphasize improving lifestyle and self-management in response to people's increasing involvement in health-related activities [9].

Multiple guidelines suggest that hospitals receiving patients with major trauma should have written and agreed guidelines for management of patients with severe chest wall trauma that must include multidisciplinary care with anaesthetic, pain and physiotherapy teams. Most information leaflets offered in other hospitals focused on smoking cessation, to ensure early activity and when to seek medical attention [10]. Training for post-discharge care should also be provided after discharge from the hospital, and this also requires planning and designing an educational plan based on the educational needs of patients. The important point is that the follow-up of the implementation of these programs is not less valuable than its design and training. Educational guidelines based on a model of health promotion were successful in enhancing patients' knowledge about lifestyle post chest trauma. These strategies may be useful in persuading patients to make behavioural changes and follow prescribed dietary and medical regimens [11].

Significance of the study

However, chest trauma carried a poor prognosis, it often led to more serious complications due to a prolonged recumbent, the prolonged loss of time from hospital employment such as dyspnea, fatigue, pain, and physical inactivity may occur that result in poor physical functioning, psychosocial, and quality of life status [8]. In Egypt, chest (thoracic) trauma carries an overall mortality rate of 15–25% [12]. In an attempt to improve patient outcomes, discharge instructions provide as a reference for patients with details about their medical condition, ongoing management and recommended follow-up. Through improving patients' knowledge and promoting self-care capabilities management, and confidence in managing their condition, which in turn enrich their lifestyle

and overall outcomes among. So that the study will be carried out to evaluate the effect of educational guidelines on lifestyle and clinical outcomes for patient with chest trauma.

Aim of the study

The aim of this study was to evaluate the effect of educational guidelines on lifestyle and clinical outcomes for patients with chest trauma at Zagazig University hospitals.

2. Research Hypothesis:

This study achieved the following hypothesis:
H1: Patient's lifestyle will be modified after implementation of educational guidelines than before.
H2: Patient's clinical outcomes will be improved after implementation of educational guidelines than before.

Subjects and Methods

Research design: A quasi-experimental research design with pre-post test was conducted to achieve the aim of the study.
Setting: The study was conducted in in outpatient chest clinic and cardio thoracic department in accidental hospital at Zagazig University Hospitals.
Subjects: A purposive sample of 50 adult patients with chest trauma and fulfill the following criteria: Adult conscious patients from both sexes, agree to participate in the study and able to communicate.

Exclusion criteria:

Patients who connected to mechanical ventilation, endotracheal tube, tracheostomy tube, and those who received educational guidelines before. Patients with neurological or mental disorder, with unstable condition and with chronic end stage disease as liver failure, cancer.

Sample size:

Sample size calculation based on year 2022 census report of patients' admission to the cardio-thoracic department, the total number of subjects assigned to perform cardio-thoracic was 400. Steve Thomson equation was used to calculate the sample size, at 5% ∞ error (95.0% significance) and 20.0 β error (80.0% power of the study) **[13].**

$$ n = \frac{N \times p(1-p)}{[[N-1 \times (d^2 \div z^2)] + p(1-p)]} $$

Where: N= Population size (400), Z= degree of standardization for 95.0% significance, it is equal to 1.96, d= Error percentage (0.05), P= Percentage of occurrence of event or not, it is 0.5. Accordingly, the sample size was determined to be 39.99. The sample size is calculated by Epi-Info software considering the confidence level 95%, power 80% and assuming the improvement after intervention will be 20% (expert opinion) the sample will be 50 patients who will receive educational guidelines.

Tools of data collection:

Three Tools were used for data collection, pertinent to this study as follow:

Tool I: Structured interview questionnaire for patient with chest trauma: (Appendix I)

Designed by researcher based on literature review [14], and opinions of expertise for content of validity. It was designed in the Arabic language to avoid misunderstanding and applied as pre and post-test. It included the following parts

Part 1: Demographic characteristics of patients with chest trauma:

This part was composed of 10 closed-ended questions that covered age, sex, marital status, level of education, occupation, income, place of residence, height, weight, body mass index.

Part 2: Medical history of patients with chest trauma

This part was concerned with assessment of past, and present medical history for patients with chest trauma. It consisted of 16 (closed and open ended) question

Part 3: Patient's knowledge regarding lifestyle and care after chest trauma: This part was concerned with assessment of patients' life style after chest trauma.

The scoring system for Patient's Knowledge Assessment:

Each question is scored "zero" for the incorrect answer and "one" for the correct answer, and these points are counted for each patient. Total score of overall patients' knowledge were 65 grades and classified as the following:

- Satisfactory knowledge if the score is ≥ 60% from the maximum score

- Unsatisfactory knowledge if it is <60% based on statistical analysis.

Tool II: Lifestyle Indicator questionnaire (Pre/post-test): (Appendix III)

It was be adapted from Fortier [15] and modified by the researcher to assess patient' lifestyle behaviors pre- and post-educational guidelines. The lifestyle indicator questionnaire had 6 items including diet (6 questions), exercise (3 questions), medications (4 questions), sleep (3question), smoking (4 questions), and stress (1 question)

Scoring system for lifestyle:

For lifestyle, overall scoring lifestyle indicator questionnaire category scores; and seven component scores, which measure diet, exercise, medication, sleep, smoking status, and stress which is provided on a scale of zero to twelve. When scoring lifestyle indicator questionnaire, a raw score is calculated for each lifestyle component. Each component had a category score of 0, 1, or 2, based on the scoring guide, with 0 indicating a poor score in that component, one indicating an intermediate score in that component and 2 indicating a healthy score in that component. The category scores are summed to determine the overall score on a scale of 0 to 12, which is also classified into overall categories of unhealthy (score 0-4), intermediate (score 5-8) and healthy (score 9-12).

Tool III: Patient' Clinical outcomes assessment questionnaire (post- test): (Appendix IV)

It was be designed by the researcher after revising of the related literature to assess clinical outcome for the patients with chest trauma and include the following three parts:

Part I: Patients complication and associated thoracic injury after chest trauma

It is consisted of twenty-one yes or no question which included patients complain at admission such as (Hemothorax, Hemopneumothorax, pneumothorax, Flail chest, Multiple rib fracture, Tension pneumothorax…etc.)

Part II: Laboratory investigation from medical record and sheet for patient with chest trauma which consists of 6 items. It included: Arterial blood gases (ABG) chest x- ray, complete blood count (CBC), sputum analysis, pulmonary function test, and vital signs.

Part III: The Medical Research Council (MRC) Dyspnea Scale. It was adopted from **Global Initiative for Chronic Obstructive Pulmonary Disease (2014)**, to assess severity of breathlessness during various activities using MRC grade (I-IV).

Administrative and ethical consideration:

At the initial interview, each potential subject was informed about the nature, purpose, benefits of the study, and informed that his/her participation is voluntary. Confidentiality and anonymity of the subjects were also assured through coding of all data. The researcher assured that the data collected, and information will be confidential and would be used only to improve their health and for the purpose of the study and there was no risk for study subject during application of the research.

The necessary approvals were obtained from the dean of the Faculty of Nursing and submitted to general director of Zagazig University Hospitals. Then Permission to carry out the study was obtained from the head of mentioned setting after explaining the purpose of the study and a verbal consent was obtained from patients for participation in the study.

Pilot study:

A pilot study was carried out on 15% (5 patients) of the main study sample to check and ensure the clarity, applicability, relevance, comprehensiveness, understanding and feasibility, and estimation of time needed to fill out the tools. Then the tools were modified according to the result of the pilot study. Simple modifications were done based on the pilot study as rephrasing and rearrangement. The pilot study was excluded from the study sample.

Field work:

The study was implemented from May 2023 till February 2024. Two months for pre- test (from the beginning of May 2023 to the end of June 2023), and 6 months implementing the educational guidelines, and 2 months for post-test (from January, 2024 to February, 2024). The guidelines were

conducted in assessment, planning, implementation, and evaluation phases.

Assessment phase: The researcher started to recruit the sample according to eligibility criteria. Those who gave their consent were interviewed individually using the data collection form. The information obtained served as baseline data or pretest and guided the researcher in the preparation to educational guideline booklet.

Planning phase: Using the assessment data and related literature, the researcher developed educational guideline to train patients and improve their lifestyle and clinical outcomes after chest trauma. The educational guidelines included a theoretical and a practical part. The researcher prepared an illustrated guideline booklet in simple Arabic language to help patients assimilate and refresh the information provided to achieve aim of the study.

Implementation phase: The researcher met with the patients individually and administered the educational in eighty sessions each session 30-45 minutes.

The first session was for orientation about the educational guideline. The researcher used simple language to suit the level of patient's education, with motivation and reinforcement to enhance learning. A copy of the booklet was offered for each patient to use it as future reference. The six sessions were theoretical and covered guidelines of care after chest trauma, and the information about the healthy lifestyle after chest trauma, such as diet, benefits of exercises (breathing, and cough exercises), daily activity, medication, sleeping pattern, smoking habits, social, emotional, family support, stress management, danger and emergency signs after discharge, instruction related reducing pain.

This was followed by twelve practical sessions that include Care of lifestyle after chest trauma, physical exercise, coughing, deep breathing exercise, relaxation technique, activities of daily living including proper setting, standing, clothing, bathing, driving, in addition to walking, dietary regimen, medication habits, smoking, sleeping pattern, stress management after chest trauma.

Evaluation phase: Each patient in the study was evaluated two times using the same data collection tools. This was done upon recruitment (pre-test), immediately after the end of the educational guidelines (post-test).

Content validity& Reliability:

It was established by a panel of 5 expertise in nursing and medical staff including: professor, assistant professor, two lecturer of Medical Surgical Nursing, and professor of cardio-thoracic disease who reviewed the instruments, and designed booklet for clarity, relevance comprehensive, understanding, applicability, and easiness for administration. Minor modifications were required.

Alpha Cronbach's test was used to measure the internal consistency of the three tools used in the current study as follow: 1st tool (patients' interviewing questionnaire) is 0.876, 2nd tool (lifestyle indicator questionnaire) is 0.890, while 3rd tool (patient' clinical outcomes assessment questionnaire) is 0.758.

Statistical analysis:

Data collected from the studied sample was revised, coded and entered using Personal Computer (PC). Computerized data entry and statistical analysis were fulfilled using the Statistical Package for Social Sciences (SPSS) version 22. Data were presented using descriptive statistics in the form of frequencies and percentages. Chi-square (χ^2) is a statistical test used to determine the relationship between categorical variables. A correlation coefficient "Pearson correlation" is a numerical measure of some type of correlation, meaning a statistical relationship between two variables. Highly significant at p-value < 0.01. Statistically significant was considered at p-value < 0.05. Non-significant at p-value ≥ 0.05

3. Results:

Table 1: Illustrated demographic characteristic of the studied patients. The age of studied patients ranged from 20-≥52 with Mean ± SD 38.24±12.02. In addition, nearly three quarters of the studied patients 72.0% were males. As well, majority of the studied patients 82.0% were married, more than two thirds of the studied patients 68.0% work, while 90.0% of studied patients had not enough family income and more than three quarters of the studied patients 78.0% were from rural residents.

As regard to height, more than half of the studied patient's height 52.0% ranged from 160 to less than 170 cm with mean SD=170.08±7.93, more than two fifths of the studied patient's weight 42.0% ranged from 90 to 100 kg with mean SD= 80.90±14.4. Also, half of the studied patient's body mass index 50.0% ranged from 25 to less than 30 with Mean± SD 27.76±2.92, and more than half of the studied patients 60.0%were educated.

Table 2: Revealed that less than one fifth of the studied patients 14.0%suffered from disease before chest trauma, more than one quarter of studied patients suffer from coronary artery disease and more than two fifths of the studied patients 42.8% suffer from diabetes. In addition, nearly one fifth of the studied patients 18.0% had previous surgeries and more than three quarters of studied patients 77.8% had previous cesarean section.

Table 3 indicated that nearly to three quarters of studied patients 74.0% suffer from cough, had chest pain as a result of cough respectively, while two fifth of studied patients 40.0% had dry cough, most of the time had difficult to breathe due to cough, and had coughing that hinder work and daily tasks. Furthermore, slightly more than one third of studied patients, 34.0% had moist cough after chest trauma, and cough lasts 3 min.

Table 4: Regarding patients' knowledge about lifestyle and care after chest trauma, table 4 showed that, less than one third 30.0% and nearly one quarter of the studied patients 24.0% had correct knowledge about healthy habits and symptoms that the patient should report immediately" pre-guidelines but improved to be majority of the studied patients (80.0%, 88.0%) respectively post-guidelines.

As evidence, in pre-guidelines 34.0% of studied patients had satisfactory level of knowledge regarding lifestyle and care after chest trauma but satisfactory level of knowledge at post-guidelines was 80.0% and there was highly statistically

significant difference (P<0.01**) between pre and post guidelines as regard all lifestyle items.

Table 5 declared that minority of the studied patients (2.0%) had healthy lifestyle regarding diet and medication pre-guidelines, while in post-guidelines 80.0%, &84.0%) of studied patients lifestyle improved to be healthy regarding diet and medication. Also, there was marked improvement in the studied patients' lifestyle indicator with highly statistically significant difference (P<0.01**) between pre and post guidelines as regard all lifestyle domains listed except the item "smoking" that there was no significant difference between pre- and post-guidelines (P>0.05). Also, less than one fifth of the studied patients 18.0% had healthy total lifestyle indicator pre-guidelines, while in post guidelines majority of studied patients (82.0%) had healthy lifestyle.

Table 6 indicated that, in pre-guidelines (16.0%, 50.0%) respectively, studied patient's had complication such as hem pneumothorax, pneumothorax. While in post-guidelines decreased to 4.0%, 18.0% based on medical management with statistically significant difference between pre- and post-guidelines in all previously items (P<0.05*) (P<0.01**) respectively. Studied patient's complication decreased post-guidelines compared to pre-guidelines as regard all items listed except the item "Multiple rib fracture"

Table 7 represented that, statistically significant relation was found in investigation among patient with chest trauma in arterial blood gases, chest x - ray, complete blood count, and pulmonary function test through pre and post guidelines with P value (P<0.01**)

Table 8 clarified that there was a highly statistically significant relation between the studied patients' total lifestyle indicator post-guidelines and age, gender, educational level and residence (p≤0.01). Additionally, there was a statistically significant relation with studied patients' marital status (p≤0.05), while there was no statistically significant relation with studied patients' job and family income (p>0.05).

Table 9 indicated that there were statistically significant differences between patient's clinical outcome and total lifestyle indicator regarding chest trauma pre-guidelines phase with P value at (0.05*). Also, it was observed that there was statistically significant difference between total lifestyle indicator regarding chest trauma and flail chest, pulse oximeter (P=0.046*, 0.035*) respective pre-guidelines phase.

4. Discussion:

Respiratory complications are the most common problems after chest trauma. Moreover, chest trauma-related symptoms and problems such as dyspnoea, fatigue, pain, and physical inactivity may occur that result in poor physical functioning, psychosocial, and quality of life status. This has resulted in negative changes to physical functioning including ability to sleep, changes in psycho-sexual function and effects on employment, financial status and ability to return to work [7]. As regards to the patients' characteristics, results of the present study revealed that the age of the studied patients ranged from 20 to 52 years old with the mean of all patients 38.24. The finding of the present study is supported with Baru et al., (2020) in the study of "Characteristics and outcome of traumatic chest injury

patients visited a specialized hospital in Addis Ababa, at Ethiopia", found that the mean age of the studied patients was 35.5 years old. Related to Gender, results of the present study showed that nearly three quarters of the studied patients were males, this finding goes in the same line with Baru et al [16], whose founded that nearly three quarters of the studied patients were males. The male predominance can be explained on the basis of that females are less exposed to external factors as compared to males. Young males are involved in high-risk-taking daily activities and outdoor activities like driving and other hazardous occupations. Moreover, Alsulaiman et al [4], in the study on "Causes and Pattern of Chest Trauma among Adults: A Scoping Review of Studies from the Middle East at SAU" indicated that the majority of the victims were males. Related to marital status, the present study revealed that majority of the patients were married. This is consistent with, Mohammed, et al [8], In the study "The Impact of Chest Physiotherapy Technique on Respiration, Pain and Quality of Life Post Thoracic Wall Fixation Surgery among Flail Chest Patients, in London" found that one third of sample were married. Concerning the level of education, the current study revealed that more than half of the studied patients were educated. The result of the present study is consistent with Gonçalves et al. [17] whose reported in their study about "Clinical-epidemiological evaluation of victims of thoracic trauma in a reference hospital in Aracaju-SE" that majority of sample had educated. This result is contraindicated with, Naghdi, et al [17], whose reported in the study about "The association between the outcomes of trauma, education and some socio-economic indicators in Iran" that most of the patients were below the high school level. This finding demonstrates that, chest trauma is spread among different level of education in the community. Regarding past medical and surgical history of the studied patients, results of the present study revealed that less than one fifth of the studied patients suffered from disease such as coronary artery disease, hypertension, diabetes before chest trauma, and nearly one fifth of the studied patients had previous surgeries. This study is in agreement with Mduma et al [18], in the study about "Pattern, Management, and Outcomes of Chest Injury at Kilimanjaro Christian Medical Centre" whose reported that less than one tenth of patients had previous history of disease such as hypertension, diabetes and previous surgical history.

Regarding cough complain, the present study indicated that less than three quarters of studied patients suffer from cough that leads to chest pain, while two fifth of studied patients most of the time had difficult to breathe due to cough, Patients with pulmonary contusion may present with chest pain, dyspnoea, coughing, and hypoxemia especially after significant chest trauma. This due to pain restricts tidal volume, leading to hypoventilation, and impairs coughing ability, leading to sputum retention; these combine to cause atelectasis and predispose to pneumonia. Additionally, injured lung tissue underlying the fractures has impaired ability to exchange gasses. These results are in contrast with Féray, et al [19], whose stated in the study about "Surgical and perioperative management of flail chest with titanium plates a French cohort series from a thoracic referral center in France" that sixth of patients were hypoxemic with ventilator-associated pneumonia and one of patients had difficulty coughing.

Regarding knowledge of lifestyle after chest trauma, in pre-guidelines third of studied patients had satisfactory level of knowledge regarding lifestyle and care after chest trauma but majority of studied patient had satisfactory level of knowledge at post-guidelines and there was highly statistically significant difference between pre- and post-guidelines. Also, demonstrated that targeted intervention plus comprehensive nursing enhances patients' treatment compliance, and helps the patients cultivate a healthy lifestyle, which shows great prognosis benefits

This result is supported with Zhang [20],who revealed in the study about "Effects of Targeted Intervention plus Comprehensive Nursing on the Quality of Life and Nursing Satisfaction in Multiple Traumas in China' 'that, after intervention, medication compliance, understanding of the disease of the study group were remarkably higher versus those of the control group. Concerning the total lifestyle indicator, the current study showed that more than three third of studied patient had unhealthy lifestyle pre-guidelines with Mean ± SD19.70 ± 4.6. This result on the same line with Gida et al [21], whose reported in their study about "Efficiency of Self-care Education on lifestyle Secondary School Students, in Egypt" that unhealthy dietary habits, sleep pattern and physical activity were poor pre-guidelines. This result is supported with Lidin et al [22], in the study about "Effects of Structured Lifestyle Education guidelines for Individuals with Increased Cardiovascular Risk Associated with Educational Level and Socioeconomic Area, in Sweden'' that participants have unhealthy lifestyle pattern. This may be due to lack of awareness toward a healthy lifestyle. In comparison, mean ± SD post guidelines of patient's lifestyle was higher than pre-guidelines.

Also, there was marked improvement in the studied patients' lifestyle indicator with highly statistically significant difference between pre and post guidelines as regard all lifestyle domains listed except the item "smoking" that there was no significant difference between pre- and post-guidelines. This result could be due to healthy practices were educated to the studied patients, which led to improve their health and lifestyle, increase awareness toward healthful eating, lessening sedentary and encourage bodily activity, improving care, promoting sleeping, and eating habits amongst chest trauma patients which has been improved after self-care educational guidelines. This result is on the same line with Gholamalishahi et al [23], in their study about "Lifestyle and Life Expectancy Questionnaire: validation and assessment in an Italian sample'' that The mean of the total lifestyle scale was 51.66±12.02, also stated that Exercising, eating a Mediterranean diet, avoiding stress, quitting smoking, reducing the intake of saturated fats and trans fats, increased intake of vegetables, legumes (beans, peas, and lentils), fruits, and whole grains and treating illnesses can all assist to reduce the risk of disease and extend life.

Also, Lidin et al [22], reported that there were no significant differences between the groups for the other lifestyle risk behaviors, including smoking, risk consumption of alcohol. This study is supported with Ahmed & Khalil [24], in their study about "Impact of educational program for patients with gastroesophageal reflux disease on lifestyle change and home remedies, in Egypt'', whose indicated that highly statistically significant difference between patient practice lifestyle post and follow up in compared with pre-application program. Regarding patients' clinical outcomes, the present study revealed that one sixth of studied patients had complication such as hem-pneumothorax. While in the assessment of patient's post-guidelines, complication decreased due to medical management such as insertion of chest tube to remove blood or air from the lung and educating patients cough, deep breathing exercise that improve breathing. This on the same line with Baru et al [16], whose indicated that one eight of studied patients had hemopneumothorax and cure from it. Also, half of studied patient's had pneumothorax. While in the assessment of patient's post-guidelines decreased to less than one quarter based on medical management with statistically significant difference between pre- and post-guidelines. Studied patient's complication decreased post-guidelines compared to pre-guidelines as regard all items listed except the item "Multiple rib fracture". This result on the same line with Marasco et al [25], whose revealed in the study about "Flail chest injury—changing management and outcomes, in Australia'', that Hemithorax was noted in less than half of patients and more than one third of patients had pneumothorax. Diaphragmatic injuries and cardiac contusion at were relatively uncommon and noted to drop slightly in incidence over time. Regarding patient's complication associated thoracic injuries such as rib fracture, lung contusion, subcutaneous emphysema didn't decrease with no significant difference between pre- post guidelines as regard all items listed. This result on the same line with Chrysou et al [26], in the study about "Lessons from a large trauma center: impact of blunt chest trauma in polytrauma patients-still a relevant problem? in Switzerland'' showed that the most common associated thoracic injuries were pneumothorax, hemothorax and pulmonary contusion. As regard to change in laboratory investigation among studied patients throughout study phases, the present study found statistically significant relation among patient with chest trauma in arterial blood gases, chest x - ray, complete blood count, and pulmonary function test through pre and post guidelines. This result is agreement with Elkhonezy et al [27], whose reported in the study about "Factors Improve Outcome of Penetrating Chest Trauma in Egypt' 'that comparison between pre and postoperative findings showed highly statistically significant differences as regard to Hb in complete blood count, also, Marasco et al [25], indicated that highly statistically significant differences as regard to Inhaled oxygen fraction. This result is in the same line with Rezk, et al [28], in their study entitled "Assessment of Isolated Blunt Chest Trauma Patients in Benha University Hospital According to Thoracic Trauma Severity Score'', in Egypt, showed that there was a significant effect on outcome as regard arterial blood gases. Concerning the relation between demographic characteristics of the studied patients and total lifestyle post guidelines, the current study clarified that there was a highly statistically significant relation between the studied patients' total lifestyle indicator post-guidelines and age, gender, educational level and residence. This is due to that education is considered an important social determinant of health, as it helps to promote and sustain healthy lifestyles and positive health choices. Additionally, there was a statistically significant relation with studied patients' marital status, while there was no statistically significant relation with studied patients' job and family income.

Table 1: Frequency and Percentage Distribution of Demographic Characteristics for Studied Patients (n=50).

Demographic Characteristics	No	%
Age		
< 25 years	6	12.0
25 - < 35 years	16	32.0
35 - < 45 years	10	20.0
≥45 years	18	36.0
Mean± SD 38.24±12.02		
Range 20 - 52		
Gender		
Male	36	72.0
Female	14	28.0
Marital status		
Married	41	82.0
Not married	9	18.0
Educational level		
Educated	30	60.0
Uneducated	20	40.0
Job		
Works	34	68.0
Does not work	16	32.0
Family income		
Enough	5	10.0
Not enough	45	90.0
Residence area		
Rural	39	78.0
Urban	11	22.0
length in centimeters		
160 - <170	26	52.0
170 – 180	24	48.0
Mean± SD 170.08±7.93		
Weight		
50 - <70	15	30.0
70 - <90	14	28.0
90 – 100	21	42.0
Mean± SD 80.90±14.4		
Body mass index		
20 - <25(normal)	9	18.0
25 - <30(above normal)	25	50.0
≥30(obese)	16	32.0
Mean± SD 27.76±2.92		

Table 2: Frequency and Percentage Distribution of Previous Medical History for Studied Patients (n=50).

Previous Medical History	No	%
Suffering from any disease before chest trauma		
Yes	**7**	14.0
No	43	86.0
Diseases related to the circulatory system and blood vessels		
Coronary artery disease	2	28.6
Diabetes	3	42.8
Hypertension	2	28.6
Had surgeries previously		
Yes	9	18.0
No	41	82.0
If the answer is yes, what is it		
Cesarean section	7	77.8
Coronary artery bypass graft	2	22.2

Table 3: Frequency and Percentage Distribution of the Studied Patients Regarding Cough Complain (n=50).

Characteristics of cough	No	%
Suffering from cough		
Yes	37	74.0
No	13	26.0
Nature of cough		
Moist	17	34.0
Dry	20	40.0
Nothing	13	26.0
Cough last		
3 min	17	34.0
5 min	12	24.0
10 min	8	16.0
None	13	26.0
Suffered from chest pain as a result of cough		
Yes	37	74.0
No	13	26.0
Difficult to breathe due to cough		
Most of the time	20	40.0
little time	15	30.0
Nothing at the time	15	30.0
Cough hinder work and daily tasks		
Yes	20	40.0
No	30	60.0

Table 4: Frequency and Percentage Distribution of Studied Patients Knowledge Regarding Lifestyle and Care after Chest Trauma throughout Study Phases (n=50)

Patients' knowledge regarding lifestyle and care		Pre		Post		X^2 P-Value
		No	%	No	%	
Diet	Correct	22	44.0	42	84.0	5.412
	Incorrect	28	56.0	8	16.0	<0.01**
Physical activity	Correct	18	36.0	39	78.0	7.669
	Incorrect	32	64.0	11	22.0	<0.01**
Healthy habits	Correct	15	30.0	40	80.0	5.046
	Incorrect	35	70.0	10	20.0	<0.01**
Medicines and care after chest trauma	Correct	17	34.0	38	76.0	5.193
	Incorrect	33	66.0	12	24.0	<0.01**
Wound care procedures	Correct	19	38.0	35	70.0	5.742
	Incorrect	31	62.0	15	30.0	<0.01**
Symptoms that the patient should report immediately	Correct	12	24.0	44	88.0	6.376
	Incorrect	38	76.0	6	12.0	<0.01**
Total level of knowledge regarding lifestyle and care after chest trauma	Satisfactory≥60%	17	34.0	40	80.0	9.683
	Unsatisfactory<60%	33	66.0	10	20.0	<0.01**

**: Highly statistically significant

Table 5: Relation between Studied Patients Lifestyle Indicator Throughout Study Phases (n=50).

Lifestyle Indicator Items		Pre		Post		X^2
		No	%	No	%	P-Value
Diet	Unhealthy	26	52.0	2	4.0	5.810
	Intermediate	24	48.0	8	16.0	<0.01**
	Healthy	0	**0**	40	80.0	
Physical activities	Unhealthy	41	82.0	5	10.0	6.941
	Intermediate	6	12.0	5	10.0	<0.01**
	Healthy	3	6.0	40	80.0	
Medication	Low Adherence	42	84.0	0	0	6.853
	Intermediate Adherence	7	14.0	8	16.0	<0.01**
	High Adherence	1	**2.0**	42	84.0	
Sleep	Not Enough Sleep	39	78.0	9	18.0	7.699
	Intermediate Sleep	6	12.0	3	6.0	<0.01**
	Enough Sleep	5	10.0	38	76.0	
Smoking	Current Smoker	3	6.0	3	6.0	3.467
	Intermediate Smoker	5	10.0	2	4.0	>0.05
	Never Smoker	42	84.0	45	90.0	
The pressures of life (Stress)	High Stress	41	82.0	3	6.0	7.375
	Intermediate Stress	5	10.0	2	4.0	<0.01**
	Low Stress	4	8.0	45	90.0	
Total Lifestyle Indicator						
Unhealthy		32	64.0	4	8.0	
Intermediate		9	18.0	5	10.0	20.32
Healthy		9	18.0	41	82.0	<0.01**
Mean ± SD		19.70 ± 4.6		54.81 ± 6.3		

**: Highly statistically significant

Patient's Clinical Outcome Post Chest Trauma

Table 6: Frequency and Percentage Distribution of Studied Patients Regarding Complication Post Chest Trauma Throughout Study Phases (n=50).

Patients' complication		Pre		Post		X^2
		No	%	No	%	P-Value
Hem-thorax	Yes	14	28.0	0	0	5.324
	No	36	72.0	50	100.0	<0.01**
Hem-pneumothorax	Yes	8	16.0	2	4.0	3.113
	No	42	84.0	48	96.0	<0.05*
Pneumothorax	Yes	25	50.0	9	18.0	8.336
	No	25	50.0	41	82.0	<0.01**
Flail chest	Yes	3	6.0	1	2.0	3.849
	No	47	94.0	49	98.0	<0.05*
Multiple rib fracture	Yes	15	30.0	15	30.0	1.245
	No	35	70.0	35	70.0	>0.05
Tension pneumothorax	Yes	4	8.0	0	0	4.058
	No	46	92.0	50	100.0	<0.05*
Associated thoracic injuries						
Rib fracture	Yes	15	30.0	15	30.0	1.757
	No	35	70.0	35	70.0	>0.05
Lung contusion	Yes	6	12.0	6	12.0	1.289
	No	44	88.0	44	88.0	>0.05
Subcutaneous Emphysema	Yes	8	16.0	8	16.0	1.194
	No	42	84.0	42	84.0	>0.05
Fracture sternum	Yes	3	6.0	3	6.0	1.059
	No	47	94.0	47	94.0	>0.05
Associated non-thoracic injuries						
Bone fracture	Yes	8	16.0	8	16.0	1.325
	No	42	84.0	42	84.0	>0.05
Head injuries	Yes	6	12.0	0	0	4.571
	No	44	44.0	50	100.0	<0.05*
Chest Tube	Yes	34	68.0	0	0	6.403
	No	16	32.0	50	100.0	<0.01**

*Significant at p ‹0.05. **Highly significant at p ‹0.01. Not significant at p>0.05

Table 7: Change in Laboratory Investigation among Studied Patients throughout Study Phases (n=50).

Laboratory Investigation		Pre		Post		X² P-Value
		No	%	No	%	
Arterial Blood Gases						
PH	Normal	17	34.0	50	100.0	6.245 <0.01**
	Acidosis	14	28.0	0	0	
	Alkalosis	19	38.0	0	0	
Pa o2	Normal	14	28.0	50	100.0	6.582 <0.01**
	Hypoxemic	36	72.0	0	0	
	Hypervolemia	0	0	0	0	
Paco2	Normal	17	34.0	50	100.0	7.655 <0.01**
	Hypomania	27	54.0	0	0	
	Hypersonic	6	12.0	0	0	
Hco3	Normal	20	40.0	50	100.0	9.103 <0.01**
	Low	13	26.0	0	0	
	High	17	34.0	0	0	
Chest x ray						
Normal	Yes	0	0	50	100.0	9.441 <0.01**
	No	50	100.0	0	0	
Atelectasis	Yes	8	16.0	0	0	8.678 <0.01**
	No	42	84.0	50	100.0	
Pleural effusion	Yes	14	28.0	0	0	6.347 <0.01**
	No	36	72.0	50	100.0	
Pneumothorax	Yes	25	50.0	0	0	8.773 <0.01**
	No	25	50.0	50	100.0	
Hydro pneumothorax	Yes	7	14.0	0	0	5.742 <0.01**
	No	43	86.0	50	100.0	
CBC						
White blood cell	Normal	13	26.0	50	100.0	8.365 <0.01**
	Abnormal	37	74.0	0	0	
Hemoglobin	Normal	23	46.0	50	100.0	6.001 <0.01**
	Abnormal	27	54.0	0	0	
Platelet	Normal	31	62.0	50	100.0	6.258 <0.01**
	Abnormal	19	38.0	0	0	
Pulmonary Function test						
Pulse dosimeter (saO2)	Normal	11	22.0	50	100.0	8.644 <0.01**
	Abnormal	39	78.0	0	0	
Incentive spirometer	Normal	11	22.0	50	100.0	9.320 <0.01**
	Abnormal	39	78.0	0	0	
Peak Flow Meter	> 80% 60-	22	44.0	50	100.0	8.334 <0.01**
	80%	19	38.0	0	0	
	< 60 %	9	18.0	0	0	

**: Highly statistically significant*

Table 8: Relation between Demographic Characteristics of Studied Patients and Total Lifestyle Indicator Regarding Chest Trauma Post-Guidelines (n=50)

Characteristics		Total lifestyle						X2 P-Value
		Unhealthy N=4		Intermediate N=5		Healthy N=41		
		N	%	N	%	N	%	
Age	< 25	3	75.0	2	40.0	1	2.4	9.345 .003**
	25 - < 35	1	25.0	2	40.0	13	31.7	
	35 - < 45	0	0	0	0	10	24.4	
	≥45	0	0	1	20.0	17	41.5	
Gender	Male	2	50.0	4	80.0	30	73.2	7.210 .001**
	Female	2	50.0	1	20.0	11	26.8	
Marital status	Married	1	25.0	1	20.0	39	95.1	3.041 .021*
	Not married	3	75.0	4	80.0	2	4.9	
Educational level	Educated	1	25.0	4	80.0	25	61	6.331 .000**
	Uneducated	3	75.0	1	20.0	16	39.0	
Job	Work	2	50.0	3	60.0	29	70.7	.686 .097
	Not work	2	50.0	2	40.0	12	29.3	
Family income	Enough	1	25.0	2	40.0	2	4.9	1.795 .065
	Not enough	3	75.0	3	60.0	39	95.1	
Residence	Rural	1	25.0	4	80.0	34	82.9	6.738 .002**
	Cities	3	75.0	1	20.0	7	17.1	

*Significant at p ‹0.05. **Highly significant at p ‹0.01. Not significant at p>0.05

Table 9: Relation between Patients Clinical Outcome and Total Lifestyle Indicator Regarding Chest Trauma Pre-Guidelines (n=50).

Patients' outcome		Total lifestyle						X2 P-Value
		Unhealthy N=32		Intermediate N=9		Healthy N=9		
		No	%	No	%	No	%	
Patients' complication	Hem thorax Yes No	6 26	18.8 81.2	3 6	33.3 66.7	5 4	55.6 44.4	1.226 0.087
	Hem pneumothorax Yes No	3 29	9.4 90.6	2 7	22.2 77.8	3 6	33.3 66.7	0.883 0.127
	Pneumothorax Yes No	18 14	56.2 43.8	4 5	44.4 55.6	3 6	33.3 66.7	1.358 0.073
	Flail chest Yes No	3 29	9.4 90.6	0 9	0 100.0	0 9	0 100.0	3.997 0.046*
	Multiple rib fracture Yes No	9 23	28.1 71.9	3 6	33.3 66.7	3 6	33.3 66.7	0.879 0.157
	Tension pneumothorax Yes No	2 30	6.2 93.8	1 8	11.1 88.9	1 8	11.1 88.9	1.098 0.069
ABG	PH: Normal Abnormal	2 30	6.2 93.8	8 1	88.9 11.1	7 2	77.8 22.2	4.665 0.013*
	Pa o2: Normal Abnormal	1 31	3.1 96.9	5 4	55.6 44.4	8 1	88.9 11.1	5.003 0.011*
	Paco2: Normal Abnormal	3 29	9.4 90.6	7 2	77.8 22.2	7 2	77.8 22.2	3.998 0.031*
	Hco3: Normal Abnormal	8 24	25.0 75.0	4 5	44.4 55.6	8 1	88.9 11.1	4.207 0.021*
Pulmonary function tests	Pulse oximeter: Normal Abnormal	2 30	6.2 93.8	2 7	22.2 77.8	7 2	77.8 22.2	3.647 0.035*
	Incentive spirometer: Normal Abnormal	5 27	15.6 84.4	3 6	33.3 66.7	3 6	33.3 66.7	1.756 0.055
	Peak Flow Meter: >80 60- 80 <60	15 12 5	46.9 37.5 15.6	3 4 2	33.3 44.4 22.2	4 3 2	44.4 33.3 22.2	0.862 0.079

*Significant at p ‹0.05. Not significant at p>0.05

This result in is supported with Gomaa et al [29], whose indicated in the study entitled "Assessment Lifestyle for Patients with Chronic Obstructive Pulmonary Disease, in Egypt" that there were highly statistically significant relations between patients' lifestyle using Miller Smith and age, gender, marital status and level of education. This result on the same line with Lidin et al [22], whose reported that Significant beneficial changes of sedentary risk behavior were seen in non-university degree and low socioeconomic area (SEA) participants over 1 year, with a significantly greater improvement in daily activity in the low-SEA group compared with the high-SEA group. Participants with low education had significantly poorer lifestyle habits pattern after treatment than participants with higher education. Previous research reports that individuals with low education and living in low SEA of residence have moreen-healthy lifestyle pattern, with a subsequent increased cardiovascular risk, compared to individuals with high education and living in high SEA. It has been suggested that health-related advices are interpreted and admitted differently by different social class groups, and that individuals with higher education are more likely to modify their diets, give up smoking, and take up healthy physical activities. Concerning the relation between patient's clinical outcome and total lifestyle pre-guidelines, the current study indicated that there were statistically significant differences between patient's clinical outcome and total lifestyle indicator regarding chest trauma pre-guidelines phase. Also, it was observed that there was statistically significant difference between total lifestyle indicator regarding chest trauma and flail chest, pulse oximeter pre-guideline phases. This may be due to patients becoming more conscious about healthy indictor of lifestyle in addition to positive effect of implementation of educational guidelines on lifestyle indicator and clinical outcomes. This result is supported with Mohamed et al [8], whose revealed that significant relation between patient Health related quality of life and pulmonary function tests, ABGS and smoking among flail chest patient were found pre and post-test. Similarly, a highly significant relation between the patients' pulse and HRQOL was found.

Also, Cinar et al [30], stated in their study about "Clinical Analysis with Trauma Scoring in Blunt Thoracic Trauma in Turkey" 'that, the lifestyle of adult patients also differentiates the severity of the trauma they are exposed to compared to the elderly. The severity of the experienced trauma increases the rate of complications to develop and chest trauma score. Even though multiple organ injuries are not within the scope of this study. We believe that the social and cultural conditions and the abilities of self-care affect the complications and recovery period. The conditions of the clinic where the patients are being treated also affect factors such as recovery, length of stay, and complications. Finally, analysis of data and discussion proved the research hypotheses in the current study showed that, patient's knowledge scores about lifestyle, increased significantly immediately after implementing educational guidelines and lifestyle modified to be healthy, as well as improved patient clinical outcome (decrease patient complications, improve results of laboratory investigation, and dyspnoea decreased).

5. Conclusions

On the light of the present study results, there was significant improvement of patient's knowledge regarding lifestyle post implementing the educational guidelines compared to pre- educational guidelines. It can be concluded

that, the educational guidelines had a positive effect on improving lifestyle and clinical outcome for patients with chest trauma.

Based upon the findings of the present study, the following Recommendations can be deduced:

- An educational guideline for chest trauma patient's condition should be available in the form of audiovisual materials.
- Training guidelines about chest trauma and its treatment modalities should be provided for chest trauma patients and their caregivers.
- Regular follow-up for all patients with chest trauma to evaluate their health conditions, clinical outcome, detect the complications and early management to improve their lifestyle.
- Replication of the study on a larger probability sample from different geographical areas for generalization of the results.

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