

Effect of Olive Oil Topical Application on Pressure Ulcer Among Patients in Intensive Care Unit

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Abstract

Background: Bedsores are injuries to skin and underlying tissues caused by prolonged pressure. Detecting pressure ulcers is an important nurse diagnostic service for patients in the intensive care unit. **Aim:** Explore the effect of olive oil topical application on pressure ulcer development prevention among patients at intensive care unit. **Methodology: design:** An experimental research design was utilized. **Setting:** Intensive care units at Menoufia University Hospital **Subject:** Purposive sample of patients at control and study group 50 patients for each. **Tools:** four instruments were used, 1st tool: Predesigned questionnaire which contained two parts, 2nd tool: BRADEN SCALE and 3rd tool: European Pressure Ulcer Advisory Panel (EPUAP) and 4th tool: The Pressure Ulcer Scale for Healing (PUSH) **Results:** presented that 56% and 18% of control group had moderate risk and high risk for pressure ulcer, while 54% and 20% of studygroup had moderate and high risk. Also, 48% and 34% of control group suffered from grade II and III, while 46% and 38% of study group suffered from grade II and grade I, with slight significant difference at p value <0.05*. **Conclusions:** olive oil had positive effect on the recovery process of pressure ulcer. Also, had positive effect on reduction of ulcer area. Furthermore, mean score of PUSH tool decreased at study group than control group. **Recommendation:** the application of olive oil is recommended for healing grade one pressure ulcers.

Keywords: Pressure ulcer, Prevention, Intensive care unit, Olive oil

Introduction

A pressure ulcer is a cell death or local injury of the skin, the underlying tissue, or both. Pressure ulcers result from insufficient tissue blood circulation due to pressure or pressure with friction, shear force, or both, and usually develop on the skin, covering the prominent bones (Sönmez & Güneş, 2020). Today, pressure ulcers are one of the 5 common causes of patient injury in the world and preventable problem regarding patient safety is known. Pressure ulcers occur mostly among the elderly and immobility patients with acute and neurological deficits (Miraj et al., 2020).

Many factors contribute to the development of pressure ulcer, most notably; severe and prolonged periods of pressure reduce or stop the blood supply, leads to tissue ischemia, and ultimately cell death. Moreover, factors such as fragility, friction, and moisture affect the ability of the tissues to withstand pressure. Also, factors such as the ability to underlie structures of the skin such as blood vessels and collagen are affected (Shakibamehr et al., 2019). The pressure ulcers are severely divided into four degrees.

These lesions range from reddish areas without altered skin, tissue destruction and necrosis to muscle and bone damage (Varaai et al., 2019).

Research show that intensive care units (ICUs) have a higher incidence rate of pressure ulcer (up to 59%) in health care (Lechner et al., 2021). There are several factors in ICU patients that increase the pressure ulcer risk. Typically, these patients have respiratory equipment, urinary catheter, several intravenous catheters, restricting devices, and infusion of vasoactive drugs due to the reduced blood pressure, all of which make the patient unable to move and increases the risk of pressure ulcers. The impact of pressure ulcers, in addition to reducing the level of health and complications in the patient, can also lead to heavy hospital costs and waste of time for nurses and medical personnel (Shi, Dumville & Cullum, 2018).

Pressure ulcer is a nursing diagnosis and requires major nursing care in patients admitted to ICUs. Prevention of this complication is a priority and a vital necessity in nurses' acute and long-term care plans; although it may happen despite all the efforts (Sardari et al., 2019). The

literature study has shown that nurses' lack of knowledge and skills can affect the performance and success of the pressure ulcers preventive interventions and may be associated with an increase in the prevalence of pressure ulcers. Therefore, nurses' proper knowledge and skills are necessary to prevent, identify and plan appropriate care of the pressure ulcers (Khojastehfar, Ghezalje & Haghani, 2020).

The protection of skin integration is the main way of pressure ulcer's prevention. Many studies have been conducted by researchers, especially nurses, to treat ulcers using herbal medicine (Karabey & Karagözoğlu, 2019). Olive is a medical plant that has attracted the attention of many researchers due to its numerous medicinal properties. In traditional medicine, this herb is used as an antihypertensive, analgesic, anti-atherosclerotic, laxative, potentiating, and antipyretic drug. This oil is composed of 98% triglycerides, including predominantly monounsaturated oleic acid which has been proven to be essential for skin maintenance and this may accelerate the recovery and healing process of wound (Meliza, Ritarwa & Sitohang, 2020).

The roll of oleic acid is a key feature within the reconstruction of cell membranes, providing higher smoothness to the dermis by restoring skin humidity levels, thus moisturizing the skin and providing it with elasticity. Besides such oil component as phenolic compounds and chlorophyll have a high antioxidant and anti-aging effects, apart from accelerating the dermis healing process. Moreover, vitamin E is included in the oil composition which is the excellent source of protection against the free radicals causing cell oxidation (Taheri & Amiri-Farahani, 2021).

One of the measures that nurses can take to protect skin and prevent pressure sores is massage. Nowadays massage is one of the therapeutic methods in the world that is dedicated to many clinical studies (Pathak & Dutta, 2021). The topical usage of olive oil is effective on reduction of acute radiation proctitis and pain, bleeding and itching caused by hemorrhoid and anal fissure. The daily usage of topical olive oil has been reported as an effective way in promoting the skin of preterm infants and it has reduced the risk of dermatitis among them (Karimi et al., 2020).

Olive is another medicinal plant whose diverse therapeutic characteristics have piqued the interest of many researchers. This herb is used as an antihypertensive, analgesic, antiatherosclerotic, laxative, potentiating, and antipyretic medication in traditional medicine. Olive leaf extracts have also been shown to have antibacterial and antifungal effects. In the Mediterranean diet, olive oil is a primary source of fat, which has been linked to a lower risk of cancer and heart disease. Sunburn, psoriasis, and skin infections can all be treated with olive oil.

Skin massaging by herbal oils is considered to be as one of important traditions in some countries. This matter would be done because of many different reasons such as prevention of infections, promoting the skin condition, thermoregulation and wholly for patients' health (Poursadra et al., 2019). Thus, the purpose of this study was to determine the effect of olive oil in prevention the development of pressure ulcer in intensive care units.

Significance of the study

Pressures ulcers are a common complication in intensive care unit (ICU) due to patient's conditions are sedated, ventilated, and/or bedridden for long periods may indirectly contribute to mortality in certain patients. Prospective study and reported 63% mortality in patients with pressure ulcer and 15% mortality in patients without pressure ulcer. Olive oil is used as a protective agent for sunburn, psoriasis and skin infections. So bed sore prevention is a very important aspect in treating critically ill patients. Since access to olive oil is quite easy and cost effective, apart from reducing the pain of patients. olive oil consumption decreased the level of hydroperoxide lipids and thereby healed the pressure ulcers (Costa et al. 2016). Therefor this study aimed to study the effect of olive oil topical application on pressure ulcer.

Aim of the study:

This study aimed to explore the effect of olive oil topical application on pressure ulcer among patientsat intensive care unit.

Research hypothesis:

H1: Olive oil topical application had positive effect on pressure ulcer prevention among patients at intensive care unit.

Subjects and Method

Research design

In order to attain the purpose of study, quasi experimental (study and control) research design was utilized

Study setting

The study conducted at intensive care units (medical, surgical and long term intensive care units) at Menoufia University Hospitals-Egypt.

Subjects

A purposive sample composed of 100 adult patients of both sexes who were diagnosed with pressure ulcer and receiving care at the previously mentioned setting. Sample was allocated randomly for the first 50 patients who were newly admitted to the ICU "control group". Then 50 patients who were newly admitted to the ICU after the control group was be allocated to the "study group".

Inclusion criteria:

- Age; from 18 -60 years
- Gender; male and female

Exclusion criteria:

Unconscious patients

Pressure ulcer stage because need long time for healing)

Sample size:

The sample size was calculated based on a study carried out by **Sue et al., (2005)** and by estimating an effect size of 0.51 and statistical power of 90%, level of confidence (1-Alpha Error): 95%, Alpha 0.05, Beta 0.1. Every group determines the sample size, which is set at 50 patients. A sample size was calculated using a test comparing two means through **Kane SP. Sample Size Calculator. ClinCalc (Rosner, 2011)**.

Tools of data collection

1st tool: Predesigned questionnaire:

1st.part: Interview questionnaire which prepared by researcher includes patient's characteristics of the patients such as: It includes age, gender, job, marital status and smoking.

2nd part: Medical characteristics: It includes mobility status and history of bed sores.

2nd tool: BRADEN SCALE: it was adopted from **Brown, 2004**. The Braden Scale for Predicting Pressure Ulcer Risk is a tool that was developed in 1987 by Barbara Braden and Nancy Bergstrom. The purpose of the scale is to help health professionals, especially nurses, assess a patient's risk of developing pressure ulcer. The Braden scale assesses patient's risk of developing a pressure ulcer by examining six criteria: Sensory perception, moisture, activity, mobility, nutrition and Friction and Shear. Total score: severe risk: 9 high risk: 10-12 moderate risk: 13-14 and mild risk.

3rd tool: European Pressure Ulcer Advisory

Panel (EPUAP); It was used to assess Grade of bed sores. The grading system for pressure ulcer classification including Grade I: Intact skin with non-blanchable redness, Grade II: Partial thickness loss of dermis presenting as a shallow open ulcer with a red, pink wound bed, without slough. May also present as an intact or open/ruptured serum-filled or serosanguinous filled blister, Grade III: Full thickness tissue loss. Subcutaneous fat may be visible, but bone, tendon or muscle are not exposed, may include undermining and tunnelling and Grade IV: Full thickness tissue loss with exposed bone, tendon or muscle. The incidence of bed sore and its grades were investigated by observation (**Defloor et al., 2006**).

4th tool: The Pressure Ulcer Scale for Healing (PUSH) tool : is a fast and accurate tool used to measure the status of pressure wounds over time. It was adapted from **Gardner et al., 2005**. The tool was designed by the National Pressure Ulcer Advisory Panel (NPUAP) and has been validated many times over. The NPUAP recommends that the tool be used on a regular basis, at least weekly or whenever the patient or wound status changes. The PUSH tool measures three parameters that are considered most indicative of healing: Wound size (greatest length x greatest width = wound surface area), Exudate amount (estimate as light, moderate or heavy after

removal of the dressing), Tissue type (closed/resurfaced, epithelial tissue, granulation tissue, slough, necrotic tissue/eschar).

Scoring system:

Tissue Type: This refers to the types of tissue that are present in the wound (ulcer) bed. Score as a 4 if there is any necrotic tissue present. Score as a 3 if there is any amount of slough present and necrotic tissue is absent. Score as a 2 if the wound is clean and contains granulation tissue. A superficial wound that is reepithelializing is scored as a 1. When the wound is closed, score as a 0.

Validity and Reliability:

It was ascertained by a group of experts in critical care nursing (3) to assess the adherence of a measure to existing theory and knowledge of the concept being measured (construct) and the extent to which the measurement covers all aspects of the concept being measured (content). Reliability is checking the consistency of results across time, across different observers, and across parts of the test itself, it was measured through cronbach alpha test. The reliability of all tools was tested by intra class reliability coefficient. It was 1.9 for tool I and 0.80 and Cronbach's alpha above 0.80 for tool II.

Pilot Study

The pilot study was carried out on 10 at ICU who represent 10% of the estimated sample size in order to test the applicability of the constructed tools and the clarity of the included questions related to nurses' knowledge and practice. The pilot also served to estimate the time needed for each subject to apply intervention. According to the results of the pilot, neither corrections nor omissions of items were performed, so the nurses were included in the pilot study, sharing in the study sample.

Preparatory Phase

This phase included reviewing of literature related to healing environment, clustered nursing care and premature. This served to develop the study tools for data collection. During this phase, the researcher also visited the selected places to be acquainted with the staff and the study settings. The tools were

under supervisors' guidance and experts' opinions was considered.

Ethical considerations:

Each patient and his family were informed about the purpose and benefits of the study in the first part before starting the questionnaire, where every one can't be starting the questionnaire without consent to participate in data collection in the current study. The patients and their family were assured that all data was used for research purpose only and each one was informed of the rights to refuse participation in the study or withdraw at any time before completing the questionnaire with no consequences.

Procedure for data Collection:

- This study started in the July 2021 and ended in the end of January 2022.
- Assessment/planning phase: clarified aim of study to each patient and nurse to when the researcher not presented then a written consent was obtained from them, and they were assured about confidentiality. Researcher told the patients about her group allocated. Researchers collect the characteristics, medical data and risk factors.
- In both groups, the bed, mattress, and sheet conditions were designed according to standard of bed sore prevention, and nutrition and excretion conditions of patients were matched in both groups. In addition, pressure ulcer care methods such as changing the position at least every 2 hours was duly performed by the nurses.
- In the study group, in addition to these care arrangements, 15 ml olive oil was rubbed gently on the wounded area once a day for 30 min without massage and the area was washed with tepid water and the skin dried.
- Evaluate and assessed the ulcer healing after the first, fourth, and seventh day of intervention, by using the pressure ulcer scale for healing (PUSH) tool and EPUAP tool.
- In both study groups, two photographs were taken on the first and seventh day, so that the ulcer healing process could be accessed for all individuals and documented.

- Weekly assessments were conducted by registered nurses on staff at site of pressure ulcer for study and control group. The registered nursing staff was trained by members of the research team in the use of PUSH and EPUAP tool.

Statistical Analysis:

Computerized data entry and Statistical analysis were fulfilled using the Statistical Package for Social Sciences (SPSS) version 22. Descriptive and analytical statistics were used such as number, percentage, mean and standard deviation. A chi-square (χ^2) statistic is a test that measures how a model compares to actual observed data. Correlation coefficients are used to measure how strong a relationship is between two variables

Highly significant if p value <0.01
Significant if p value <0.05
Insignificant if p value >0.05

Results:

Table (1) revealed that mean age of control group was 31.4±3.45 years, while study group was 32.1±2.99 years. Related gender, there was no significant difference between control and study group at p value <0.05*. Additionally, according to marital status, 74% of patients at control group were married, while 68% at study group. Also, there was no significant difference among study and control group related BMI and smoking habit at p value >0.05.

Table (2) revealed that 54% of control group was very limited mobility, while 50% at study group had no significant difference at p

value >0.05. According to head of bed, 14% of patient at control group was completely flat, while 12% at study group with no significant difference at p value >0.05. Regarding, history of bed sores 36% of control group patients had history, while 40% at study group with no significant difference at p value >0.05.

Table (3) portrayed that mean score of control group about sensory perception and moisture was 2.76±0.73 and 2.10±0.54, while study group was 2.68±0.59 and 2.12±0.38 at p value >0.05. According to, activity and mobility mean score of control group was 2.31±0.66 and 2.49±0.35, while study group was 2.26±0.39 and 2.41±0.29 at p value >0.05. Regarding to, nutrition and friction and shear mean score of control group was 2.14±0.29 and 1.25±0.41, while study group was 2.10±0.34 and 1.20±0.33 at p value >0.05 for them.

Figure (1) represented that 56% and 18% of control group had moderate risk and high risk for pressure ulcer, while 54% and 20% of study group had moderate and high risk.

Table (4) there was statistically significant difference between study and control group at p value <0.05*. and improve at study group than control group.

Table (5) portrayed that significant difference between study and control group related to Length (cm), Exudate amount and Tissue type of bed sores grade p value <0.05*.

Table (6) showed that there was high positive correlation between Braden scale and pressure ulcer scale for healing among study group and control group at p value <0.01**.

Table (1): Distribution of studied patients according to their characteristics (n= 100)

Items	Control (n=50)		Study(n=50)		Chi-squareP value
	No.	%	No.	%	
Age:					
18 – < 28	15	30	16	32	1.223 >0.05
28 – <38	25	50	22	44	
38 or more	10	20	12	24	
Mean SD	31.4±3.45		32.1±2.99		
Gender:					
Male	19	38	26	52	4.566 <0.05*
Female	31	62	24	48	
Marital status:					
Married	37	74	34	68	1.707
Not married	13	26	16	32	>0.05
Job					
Work	18	36	25	50	3.990
Not work	32	64	25	50	<0.05*
BMI					
Underweight	5	10	6	12	1.066 >0.05
Normal	22	44	20	40	
Overweight	16	32	17	34	
Obesity	7	14	7	14	
Smoking					
Yes	11	22	14	28	1.456
No	39	78	36	72	>0.05

Highly significant if p value <0.01

Significant if p value <0.05

Insignificant if p value >0.05

Table (2): Distribution of studied patients according to their medical characteristics(n= 100)

Items	Control N=50		Study N=50		Chi-squareP value
	No.	%	No.	%	
Mobility:					
Completely limited	7	14	8	16	0.987 >0.05
Very limited	27	54	25	50	
Slightly limited	8	16	8	16	
No limitation	8	16	9	18	
Head of bed					
Completely flat	7	14	6	12	1.309 >0.05
15 degree	9	18	11	22	
30 degree	15	30	14	28	
45 degree	12	24	10	20	
60 degree	7	14	9	18	
History of bed sores					
Yes	18	36	20	40	0.912
No	32	64	30	60	>0.05

Highly significant if p value <0.01, Significant if p value <0.05

Insignificant if p value >0.05

Table (3): Distribution of studied patients according to their Braden scale characteristics(n= 100)

	Control	Study	T test P value
	Mean SD	Mean SD	
Sensory perception	2.76±0.73	2.68±0.59	1.089 >0.05
Moisture	2.10±0.54	2.12±0.38	1.122 >0.05
Activity	2.31±0.66	2.26±0.39	1.007 >0.05
Mobility	2.49±0.35	2.41±0.29	1.305 >0.05
Nutrition	2.14±0.29	2.10±0.34	1.291 >0.05
Friction and shear	1.25±0.41	1.20±0.33	1.044 >0.05
Total	13.05±2. 60	12.77±2.31	1.970 >0.05

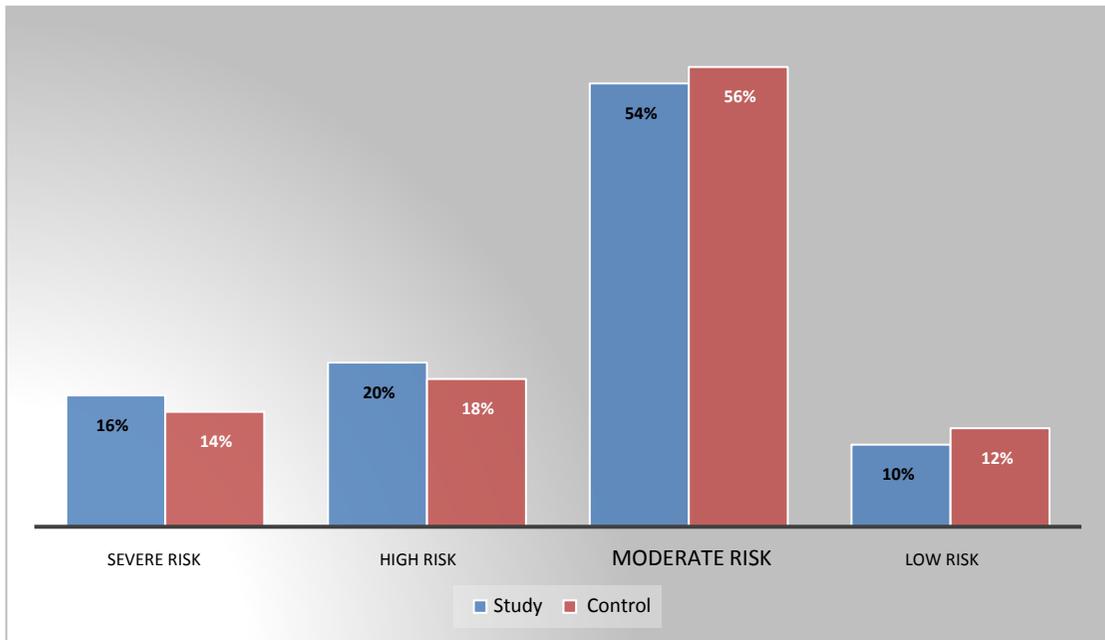


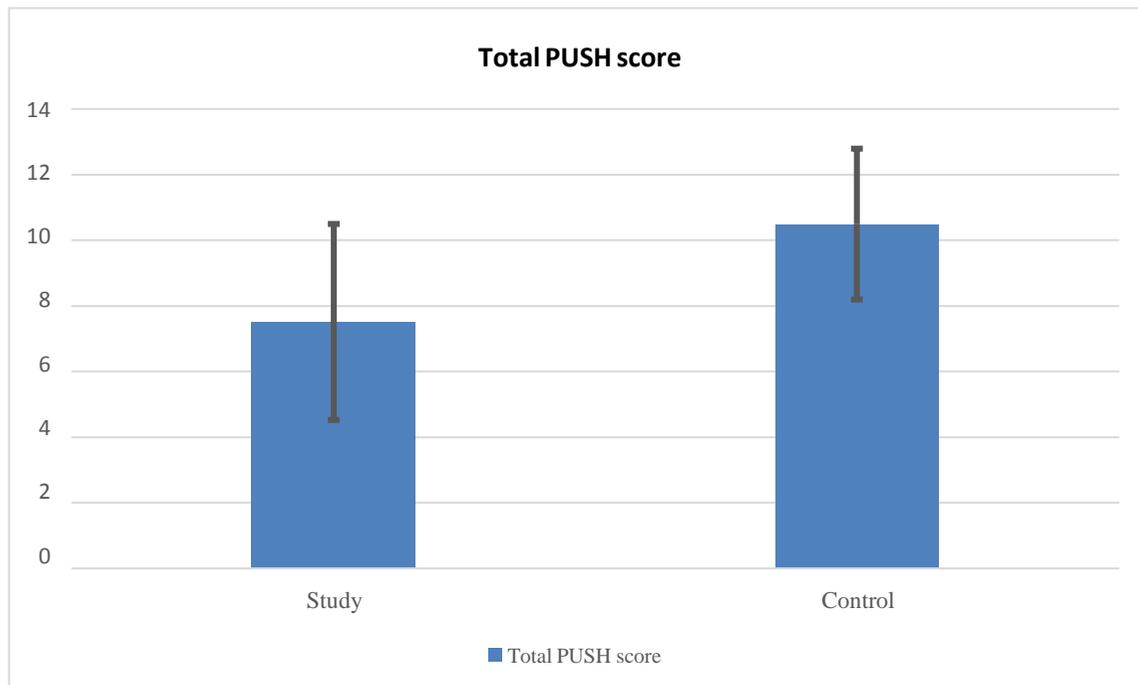
Figure (1): Distribution of studied patients according to their total braden scale (n=50)

Table (4): Distribution of studied patients according to grade bed sores through European Pressure Ulcer Advisory Panel after intervention (n=50)

Items	Control N=50		Study N=50		Chi-square P value
	No.	%	No.	%	
Category/Stage I Pressure Ulcer: Non-Blanchable Redness of IntactSkin	9	18	19	38	6.005 <0.05*
Category/Stage II Pressure Ulcers: Partial-Thickness Skin Loss or Blister	24	48	23	46	
Category/Stage III: Full-ThicknessSkin Loss (fat visible)	17	34	8	16	

Table (5): Mean score of studied patients according to grade bed sores through Pressure Ulcer Scale for Healing study and control group (n=50)

Items	Control	Study	T test P value
	Mean SD	Mean SD	
Length (cm)	6.9 (\pm 1.47)	4.8 (\pm 1.56)	5.998 <0.05*
Exudate amount	0.51 (\pm 0.31)	0.29 (\pm 0.16)	6.111 <0.05*
Tissue type	2.4 (\pm 0.85)	3.1 (\pm 0.91)	5.415 <0.05*
Mean total PUSH score (SD)*	7.51 (\pm 2.99)	10.49 (\pm 2.30)	4.781 <0.05*

**Figure (2):** Distribution of studied patients according to their mean of total PUSH scale study and control group (n=50)**Table (6):** Correlations between studied variables study and control group.

Braden scale and pressure ulcer scale for healing	r.	p. value
study group	0.544	<0.01**
control group	0.462	<0.01**

*Slight significant <0

Discussion:

The study mentioned that mean age of control group was 31.4 ± 3.45 years, while study group was 32.1 ± 2.99 years. Related gender, there was slight significant difference between control and study group at p value <0.05*. Additionally, according to marital status, less than three quarters of patients at control group were married, while more than two thirds at study group. Also, there was no significant

difference among study and control group related BMI and smoking habit.

The results of the present study revealed that more than half of control group was very limited mobility, while half at study group with no significant difference. According to head of bed, less than one fifth of patient at control group and study group was completely flat. Regarding, history of bed sores more than

one third of control group patients had positive history, also more than one third at study group with no significant difference.

These results attributed to researchers were keen to select the samples that met the predetermined criteria, and the current results revealed that there was no statistically significant difference between the study and control groups in age, marital status, BMI, smoking, mobility, head of bed, history of bed sores ($p > .05$). Therefore, the two study groups were similar.

These results supported with study done by **Miraj et al., (2020)** who conducted the clinical trial, 72 patients eligible for hospitalization in hospitals of Isfahan University of Medical and reported that there was no significant difference between studied groups related age, BMI, smoking and location of wound at p value >0.05 . Also, **Poursadra et al., (2019)** performed a quasi-experimental study was conducted to evaluate the effectiveness of olive oil or henna on the patients with pressure ulcers/sores and stated that the current study included 17 men (47.2%) and 19 women (52.8%) (mean age = 57.53 ± 16.32 year) as the control group; 19 men (52.8%) and 17 women (47.2%) (mean age = 57.67 ± 17.25 year) as the henna group; and 16 men (44.4%) and 20 women (55.6%) (mean age = 65.39 ± 19.21 year) as the olive group ($P > 0.05$). Other baseline and clinical characteristics were similar in these three groups.

According to assess risk factors of patients related bed sores, the current study revealed that more than half of control and study group had moderate risk for pressure ulcer, with no significant difference at p value >0.05 . These results disagreement with **Jansen et al., (2020)** who performed a cross-sectional, quantitative study that evaluated all patients hospitalized in an ICU between November 2016 and February 2017 and stated that regarding the assessment of risk of developing PU, according to the Braden Scale, individuals classified as having a very high risk of developing PU and who developed it represented the majority of them. Additionally, **Bereded et al., (2018)** conduct a cross-sectional institutional based study and reported that hundred sixty-six of the respondents had no impairment in their sensory

perception and about half walked frequently in their activity. Regarding mobility, less than half of patients had no limitation. Of the total admitted patients were rarely moist, two-thirds of them had no apparent problem in their friction/shear and one-third of them had probably inadequate nutrition.

Furthermore, according to European Pressure Ulcer Advisory Panel, our study mentioned that about half and about one third of control group suffered from grade II and III, while less than half and more than one third of study group suffered from grade II and grade I, with slight significant difference at p value $<0.05^*$. Finally, total PUSH score, mean score of control group was 7.51 (± 2.99) while study group was 10.49 (± 2.30) with slight significant difference at p value $<0.05^*$. Moreover, there was slight significant improvement at bed sores of study group than control group. These results may be due to the topical usage of olive oil is effective on reduction of acute radiation proctitis and pain, bleeding and itching caused by hemorrhoid and analfissure.

These results supported with **Abbas et al., (2015)** performed a clinical trial was accomplished in 2014 with 60 patients and revealed potential effects of topical olive oil to prevent bedsores in I.C.U. patients. Similar studies by **Alto Costa et al., (2016)** showed that olive oil consumption decreased the level of hydroperoxide lipids and thereby healed the pressure ulcers. In addition, **Peimard et al., (2016)** studied the effect of topical olive oil in prevention of bedsores thereby demonstrating that use of topical olive oil was effective in the prevention of bedsores. **Varaei et al., (2019)** performed double-blind randomized clinical trial that was performed on 90 patients admitted to ICU Hospital and the results showed that olive Oil and sweet almond massage is effective in preventing pressure ulcer. A similar study to this study should be done using other herbal products such as Aloe Vera gel to prevent Pressure ulcer. Furthermore, **Nahed, (2018)** who done a quasi-experimental research design was utilized and concluded as there is positive effect of using olive oil massage to prevent bed sores among hospitalized immobilized elderly. **Rosa et al., (2014)** showed that consumption of olive oil caused an increase in tissue recovery.

Conclusion:

Olive oil had positive effect on the recovery process of pressure ulcer. Also had positive effect on reduction of ulcer area. Moreover, mean score of PUSH tool decreased at study group than control group.

Recommendation:

- Based on the effect of olive oil in the reduction of ulcer area and the average PUSH score obtained in ICU patients, the application of olive oil is recommended for healing grade one pressure ulcers.
- It is further recommended to conduct this study on other populations including patients with underlying diseases. Moreover, it is suggested to use olive oil in the treatment of this type of ulcers in view of its easy availability and low cost.
- It is therefore recommended that further studies should be conducted to evaluate the effectiveness of different doses of olive oil on pressure ulcer recovery and comparing their effects on different grades of pressure ulcer.

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