Low Back Pain among Intensive Care Unit Nurses at Governmental Hospitals in Gaza Strip

آلام أسفل الظهر لدى ممرضي وحدة العناية المركزة بالمستشفيات الحكومية في قطاع غزة

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A thesis submitted in partial fulfilment of requirmemts for the degree of master of critical care program

November, 2021

Declaration

I understand the nature of plagiarism and I am aware of the University's policy on this.

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إقرار

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Low Back Pain Among Intensive Care Unit Nurses at Governmental Hospitals in Gaza Strip

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آلام أسفل الظهر لدى ممرضي وحدة العناية المركزة بالمستشفيات الحكومية في قطاع غزة

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The Islamic University of Gaza

عمـادة البحث العلمي والدراسات العليا

هاتف داخلي: 1150

نتيجة الحكم على أطروحة ماجستير

بناء على موافقة عمادة البحث العلمي والدراسات العليا بالجامعة الإسلامية بغزة على تشكيل لجنة الحكم على أطروحة الباحثة/ حنين مهدي حسين ابو بكره لنيل درجة الماجستير في كلية التمريض/ قسم تمريض العناية الحثيثة وموضوعها:

آلام أسفل الظهر لدى ممرضي وحدة العناية المركزة بالمستشفيات الحكومية في قطاع غزة

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وبعد المناقشة التي تمت اليوم الاثنين 1 جمادي الأولى 1443هـ الموافق 2021/12/06م الساعة الثامنة والنصف صباحا، في قاعة مؤتمرات مبنى طيبة اجتمعت لجنة الحكم على الأطروحة والمكونة من:

د. عبد الكريم سعيد رضوان	مشرفا ورئيسا	
أ. د. أشرف يعقوب الجدي	مناقشا داخليا	
د. أيمن مصطفى أبو مصطفى	مناقشا خارجيا	

وبعد المداولة أوصت اللجنة بمنح الباحثة درجة الماجستير في كلية التمريض/قسم تمريض العناية الحثيثة.

واللجنة إذ تمنحها هذه الدرجة فإنها توصيها بتقوى الله تعالى ولزوم طاعته وأن تسخر علمها في خدمة دينها ووطنها.

والله ولي التوفيق،،،

عميد البحث العلمي والدراسات العليا

أ. د. يوسف ابراهيم الجيش

Abstract

Low Back Pain (LBP) comprises a significant occupational hazard in nursing profession. This study aimed to identify LBP among intensive care unit nurses at governmental hospitals in Gaza governorates. The design of this study is cross-sectional one. The study population consisted of 120 nurses who represented all the target population. The researcher used a self-constructed, self administered questionnaire. In total, 120 respondents completed the questionnaire with a response rate of 96%. Different statistical procedures were used for data analysis including cross tabulation, percentages, mean and Chi square test. Face, content and criterion related validity were done. Reliability testing was done by using the Cronbach's Alpha coefficient was good (0.851%). The results revealed that the overall prevalence of low back pain among intensive care unit nurses was 68.3%. Around one third of the participants complained of moderate pain, 18.3% complained of severe pain, and 17.1% complained of mild pain. Regarding the features of pain, 37.8% described their pain as a stiffness sensation in nature, 18.3% reported numbness, 18.3% were not clear in their description of the experienced pain. Less than 12.2% reported a mixture of numbness and tingling. Nearly half reported complaining of an intermittent pain, while 11.0% had a continuous pain. The prevalence of pain was 58.3% among males and 41.7% among females. The highest complaint of LBP was among age group 26 – 30 years '43.3%' followed by the age group less than 30 years '31.7%'. The prevalence of LBP was 31.7% among single participants especially those with BMI Normal weight; with a prevalence of 55.8%. There were no statistical significant differences between gender, age, marital status and years of experience and LBP distribution. There were significant differences between the place of work and experiencing low back pain in favor of Al Shifa Hospital. Prolonged time standing during work was the main risk factor for low back pain (97.6%), followed by Bending and twisting during work (93.9%), Lifting heavy objects (92.7%). The majority of intensive care unit nurses have adequate knowledge regarding safety measures during work; however, there were obvious gaps in work environment, shortage staffing, lack of comfortable seats, lack of mechanical devices for patients' lifting and high level of noise. The study concluded that work related LBP was high among intensive care unit nurses which might affect work quality, productivity and the quality of nurses life. The results of the study imply the need for designing intensive care unit departments in a way that considers safe ergonometric conditions. Measures to reduce LBP at work include; ensuring adequate staffing, providing breaks between operations and providing needed equipment.

الملخص

هدفت هذه الدراسة إلى معرفة ألم أسفل الظهر، مدى انتشاره، حدته، خصائصه، وصف الألم، وعلاقته ببعض المتغيرات مثل الجنس، العمر، سنوات العمل والحالة الاجتماعية. استخدم الباحث دراسة وصفية مقطعية، وقد تكون مجتمع الدراسة من جميع الممرضين العاملين بأقسام عناية مستشفيات قطاع غزة الحكومية. تكون مجتمع الدراسة من 120 فردا منهم 41.7 % ذكور و58.3% إناث، تكونت أداة الدراسة من استبانة تم إعدادها لقياس متغيرات الدراسة، لقد تم توزيع 120 استبانه على الممرضين العاملين في أقسام العمليات وقد استجاب منهم 120 موظفاً أي مانسبته 90.0%. وقد كانت نسبة استجابتهم لاستبانة الدراسة 90%، وقد قام الباحث بإجراء اختبارات الصدق والثبات للاستبانة من خلال عينة استطلاعية تكونت من 20 فرد. وقد قام الباحث باستخدام المعالجات الإحصائية للحصول على نتائج سليمة مثل: التكرار، النسب المئوية، المتوسط الحسابي، ومربع كاي.

ظهرت نتائج الدراسة انتشار ألم أسفل الظهر بنسبة 70.6% بين ممرضي العناية وبلغت النسبة 68.2% بين الذكور و78.8% بين الإناث، وكان أفراد الفئة العمرية من (31–40عام) الأكثر شكوى من ألم أسفل الظهر حيث بلغت نسبتهم 84.0% يليها أفراد الفئة العمرية من (48 – 58عام) وبلغت نسبتهم 75.0%.

كانت نسبة الذين يشكون من ألم أسفل الظهر من غير المتزوجين 68.3% وقد كانت أعلى نسبة مقارنةً بالفئات الأخرى، كما أظهرت نتائج الدراسة أن 63.4 % من أفراد عينة الدراسة يعانون من ألم معتدل، 18.3% يعانون من ألم حاد، 17.1 % ألم خفيف، وقد وصف 37.8% من أفراد العينة الألم على شكل تصلب و18.3% على شكل نمنمة،18.3 %وصفوه بأنه غير واضح، 12.2 % وصفوه على شكل حرقان. كما أظهرت نتائج الدراسة أن 59.8% من أفراد عينة الدراسة اشتكوا من ألم متقطع و11.0% اشتكوا من ألم مستمر، كما تبين أن 64.02% من الذين اشتكوا نادراً ما يأخذا إجازة مرضية، بينما أظهرت النتائج بأن 31.40% دائما يأخذون إجازة مرضية بسبب ألم أسفل الظهر. أظهرت النتائج عدم وجود فروق ذات دلالة إحصائية بين انتشار الألم وبين متغيرات (الجنس، العمر، الحالة الاجتماعية وعدد سنوات العمل). وقد أظهرت نتائج الدراسة فروق ذات دلالة إحصائية بين حدة الألم وبين متغيرات (عدد سنوات العمل ومكان العمل).

بالنسبة للألم وعوامله فقد رأى 97.6% من أفراد عينة الدراسة بأن الوقوف لفترة طويلة كان أكثر محددات الألم يليه الانحناء والالتواء بنسبة 93.9%، حمل اشياء ثقيلة 92.7%،ضغط العمل الشديد بنسبة 91.5%.

أظهرت نتائج الدراسة بأن هناك حاجة لإدخال بعض التعديلات على بيئة أقسام العناية في المستشفيات مثل تزويد أقسام العناية بطاقم تمريضي كافٍ، توفير كراسي مريحة، إصلاح أرضيات بعض الأقسام، توفير أجهزة متحركة لحمل المرضى ونقل الأجهزة الثقيلة والتقليل من الضوضاء. كما وأظهرت النتائج بان غالبية ممرضي أقسام العناية لديهم معرفة جيدة وكافية حول تدابير ومعايير السلامة في مكان العمل. أما بالنسبة للاقتراحات فقد أظهرت نتائج الدراسة بأن توفير طاقم تمريضي كافٍ يشكل المرتبة الأولى من المقترحات.

بسم الله الرحمن الرحيم

﴿يَا أَيُّهَا الَّذِينَ آمَنُوا إِذَا قِيلَ لَكُمْ تَفَسَّحُوا فِي الْمَجَالِسِ فَافْسَحُوا يَفْسَحِ اللَّهُ لَكُمْ ۖ وَإِذَا قِيلَ انْشُزُوا فَانْشُزُوا يَرْفَعِ اللَّهُ الَّذِينَ آمَنُوا مِنْكُمْ وَالَّذِينَ أُوتُوا الْعِلْمَ دَرَجَاتٍ ۚ وَاللَّهُ بِمَا تَعْمَلُونَ خَبِيرٌ﴾

(المجادلة: 11)

Declaration

I certify that this thesis submitted for the degree of Master, is the result of my own research, except where otherwise acknowledged, and this study (or any part of the same) has not been submitted for a higher degree to any other university or institution.

Signature:

Haneen Mahdy Abo Bakra

Date: Nov. 30,2021

Acknowledgment

Praise be to God, Lord of the Worlds, and prayers and peace be upon the most honorable of the prophets and messengers, our master Muhammad, praise be to God who has given me the help and ability to complete this message.

I would like to express my deep gratitude to everyone who contributed to the success of this work. Without their help and assistance, this work would not have been completed.

I would like to convey my sincere thanks and appreciation to my husband for his constant care and lovely patience during my studies.

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I would like to thank all the faculty and administrators at the College of Nursing at the Islamic University of Gaza for their guidance and support.

I hope this study could be helpful for the practice in intensive care unit and for anyone concerned .

With respect and best of wishes

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BMI	Body Mass Index
B.C	Before century
EGH	European Gaza Hospital
CCU	Critical Care Unit
CLBP	Chronic low back pain
EODS	European Occupational Diseases Statistics
GS	Gaza Strip
GNP	Gross National Product
ICU	Intensive Care Unit
ITU	Intensive Treatment Unit
LBDs	Low Back Disorders
LBP	Low Back Pain
MoH	Ministry of Health
MSDs	Musculoskeletal Disorders
NIOSH	National Institute for Occupational Safety and Health
NIAMS	National Institute of Arthritis and Musculoskeletal and Skin Diseases
NINDS	National Institute of Neurological Disorders and Stroke
NGOs	Non Governmental Organizations
PLO	Palestinian Liberation Organizations
UNRWA	United Nations Relief and Works Agency
WB	West Bank

Chapter 1
Introduction

Chapter 1
Introduction

1.1.Introduction

Low back pain (LBP) is one of the most common musculoskeletal problems for seeking medical advice. LBP is a common problem in today's world. Its prevalence is increasing, so that currently, 40% of the general population suffers from LBP in their lives (Sezgin D, et al. 2015).

Among nurses the lifetime prevalence was found to be slightly higher, Studies show that LBP is the most common musculoskeletal problem among nurses, with a prevalence of 66%–77% (Tan BK,et al. 2015). Low back pain is the leading cause of disability and affects 9.4% of the global population (Hoy et al., 2014).

Despite this high prevalence, the etiology and the nature of LBP are not yet well understood. Many studies have been performed in various occupational settings, indicating a strong association between LBP and work related factors. This was also found among nurses. The contribution of psychosocial factors and work pressure was also evident, but not as clear as has been shown for the physical factors. It is generally accepted that nursing staff belong to the group of high-risk professions with regard to the occurrence of musculoskeletal injuries, especially in the area of the lumbar spine (Roupa, et al.,2008).

LBP is prevalent in many industrialized societies. Prevalence rates of 39.1% and 21.2% have been reported in the general population in these societies. An estimated 12% of nurses leave the profession annually because of back injuries, and over half complain of chronic back pain (Nelson, 2006). Occupational standing is widespread within industrialized countries and across professions. In Germany and Canada, about 40–50% of the full-time working population are required to stand for the larger time of their shifts (Wittig et al., 2013)

The nature of work influences the prevalence of low back pain among nurses. Nurses working in areas requiring strenuous physical activity are more prone for low back pain. Improper postural mechanics also has a direct effect on the prevalence of low back pain. Patient lifting and postural requirements during the work poses a high risk to nurses in a hospital environment (Zoe Roupa et al., 2013).

MSDs comprise significant occupational injuries and disability in nursing profession. Risk factors are known to include workplace activities such as manual handling, heavy lifting, strenuous tasks and work environment. Personal and psychosocial factors such as frequent low mood, low work support from superiors and body size variability are also important predictors in the development of this condition. Various international studies have shown that hospital nurses represent a significant nursing sub-group who are often affected by MSDs. Health care workers responsible for manual patient handling face a number of risk factors for MSDs in the workplace, such as back and shoulder injuries (Corbeil et al. 2017).

Prospective studies find predominantly non-significant relationships or inconsistent results. However, reduced lateral bending of the spine has been identified as a risk factor in two studies (Dawson, et al. 2007).

In Gaza strip governmental hospitals, there are several factors leading to LBP among intensive care unit (ICU) nurses due to occupational hazards leading them to suffer from it. The shortage of staff among nurses in Gaza hospitals in general, and specifically in ICU put the nurse in a critical position corresponding to the LBP problems. Solutions must put by educating policy makers, the workforce, and the nurses of tomorrow about leading risk factors to decrease the prevalence of LBP episodes.

1.2.Significance of the problem

LBP is considered very important issue for nursing staff in ICU. There is a lack of studies about the determinants of LBP among ICU nurses in Palestine particularly; where it impedes the work in the ICU units by nurses absenteeism, especially in Gaza, also the stress related to the back pain must be taken into consideration because it is very important to link such issue and to test it. The prevalence of LBP among physical therapy professionals in Gaza Strip is 56.9% (Masoud, 2008). As I had been working in intensive care unit, to the best of my knowledge, it is very important to study the determinants of LPB among ICU nurses since the workload over them is back-breaking. Lack of annual assessment for ICU nurses to diagnose and to predict such problems by early investigation is caused by inattention of decision makers in hospitals. It may be a stimulus to deal with such problem, knowing the causes,

prevention and/or management. The determinants of any health problem are considered as indicators for the health of the population considered. This study tackles a modern approach to organizational development and helps to integrate a health of ICU nurses, activity and fitness as a daily requirement. In addition, this study highlights the determinants underpinned by causes and management strategies, which will help in developing the nurses especially in ICU, and limiting the occurrence of burnout. To the best of my knowledge, there are no previous studies related to this field, the researcher will make his study in Gaza Strip to assert this problem. This study is the first one to be conducted in Gaza Strip.

1.3. General objective

General objective of this study is to assess LBP among ICU nurses in Gaza governmental hospitals.

1.4. Specific objectives

1- To determine the most common risk factor that cause LBP among ICU nurses in Gaza governmental hospital.
2- To describe the characteristics of LBP (severity, duration, radiation, nature and prevelence).
3- To identify the impact of socio demographic characteristics (age, gender, marital status place of work , years of experience and BMI) on the of LBP among ICU nurses in Gaza governmental hospitals.
4- To suggest recommendations for decision makers to prevent LBP among ICU nurses in Gaza governmental hospitals.

1.5. Research questions

1- What are the main risk factors that cause LBP among ICU nurses in Gaza governmental hospitals ?
2- What is the severity, duration, radiation, nature, of LBP among ICU nurses in Gaza governmental hospitals ?
3- Are there statistical differences in LBP among ICU nurses related to gender, age, place of work, years of experience, marital status and BMI ?

4- What is the level of knowledge about safety measures during work among ICU nurses ?

1.6. Theoretical definition of variables

- **Lowe back pain:** Low back pain is a common LBP symptom that caused by a variety of diseases and affect the lumbar spine. LBP is often attended by sciatica, which is pain that includes the sciatic nerve and is felt in the lower back, the buttocks, and the backs of the thighs (Medical Dictionary, 2020).

- **Intensive care unit:** ICU also known as a Critical Care Unit (CCU), Intensive Therapy Unit or Intensive Treatment Unit (ITU), is a special department of a hospital that provides intensive- care medicine. ICU most of which are life-threatening and need constant, close monitoring and support from specialist equipment and medication in order to maintain normal bodily functions (Intensive Care Society, 2020**).**

- **Nurses in intensive care unit:** Nursing with a attention on the greatest care of the critically ill or unstable patients following widespread injury, surgery or life threatening diseases (Intensive Care Society, 2020).

- **Governmental hospital:** Governmental hospital is an organization for health care providing patient treatment by equipment and specific staff that are funded by the state (Medical Dictionary, 2020).

1.7. Operational definitions of variables

- **Low back pain:** A established case within Gaza governmental hospitals intensive care unit nurses of common symptoms of musculoskeletal disorders including the lumbosacral vertebrae and associated soft tissue structures.

- **Intensive care unit nurse:** An ICU is a health care worker who is a specialized registered nurse working in any Gaza governmental hospital ICU. An ICU nurse is accountable for the supply of all of the patient's needs and for keeping of inventory of all of the many items that are used through the care, and has at least 6 years of experience in this field and has an age between 23-60 years.

- **Gaza governmental hospital:** An organization that follows the Palestinian Ministry of Health (MoH), located in Gaza strip and It contains an ICU for surgical

procedures, and providing medical services beyond those available in physicians' offices.

1.8. Context of the study

This study was conducted governmental hospitals in Gaza Strip; therefore, the researcher presents some background information about the geographical context, Palestine population, economy, and health care services that influences by them. However, others information about the place of the study that some include governmental hospitals in Gaza Strip such as Alshifa medical complex, Nasser medical complex, European Gaza, Aqsa Martyrs, and Indonesian hospital.

- **Demography and sample Palestine History:** Palestine was known in ancient history as the land of Canaan, when Abraham migrated to the land of Canaan it was a well- developed country. The residents of ancient Palestine entered the land of Canaan from Crete about 1250 before century (B.C.) and settled in the coastal areas. They were the people who gave Palestine its name, and the land of Canaan since roman times has been known as Palestine. The entire area of Palestine is about 27, 000 Km^2, El- Hoola lakes and half of the area of Dead Sea. Now, Palestinian territories are comprised of two areas separated geographically, the WB and GS. The total area is 6279 Km^2. (annex 1).

- **Gaza Strip:** Gaza strip (GS) is a very crowded place with an area 365 Km2 and constitutes only 6. 1% of the total area of the Palestinian land. In the year 2020, the total population in GS was 2.05, mainly concentrated in the cities, small village, and eight refugee camps that contain two thirds of the population of GS (Palestinian Central Bureau of Statistics, 2020).

- **Demography of Palestine:** The total population living in the Palestinian territories was estimated at 5.1 million at the end of year 2020. About 3.05 million live in the West Bank and 2.05 million in Gaza Strip (Palestinian Central Bureau of Statistics, 2020).

The most of GS population is refugees (75%) and 40% of them live in the camps (UNRWA, 2020) and the population pyramid the age group 15- 60 years (the working age) represents about 60%, the annual growth rate of GS was 3.1%, and life expectancy at birth was 70.4 years for males and 73.9 years for females (MOH, 2020).

1.9. Health sector in the Gaza Strip

The main healthcare providers in the GS are the MoH and other providers of healthcare as the United Nations Relief Agency for UNRWA, Military of Medical Services, non-governmental organizations and the private healthcare sector. MoH is responsible for supervising, regulating, licensing and supervising all health services. The total number for hospitals in the GS is 34, 13 for MoH, 17 for non-governmental organizations, 2 for Military of Medical Services and two private hospitals. These hospitals have 3049 beds in total. 105 of beds are for ICUs, 98 in MoH hospitals and 7 in the private hospitals. In addition, the GS has many of primary health care centers. 52 of these centers owned and supervised by MoH and 22 of centers owned by UNRWA and supervised by MoH. There are five major MoH hospitals in the GS including ICUs with total capacity number 54 beds: Al Shifa Medical Complex with 30 nurses and 12 beds in the ICU, Nasser Medical Complex with 30 nurses and 12 beds in the ICU, 7 European Gaza Hospital with 30 nurses and 12 beds in the ICU, Al Aqsa Hospital with 20 nurses and ten beds in the ICU and Indonesy Hospital with 20 nurses and 8 beds in the ICU. These hospitals provide variety of healthcare services for all people in the GS at both crisis and normal times as emergency, medical and surgical services beside the other healthcare agencies (MOH, 2019).

Chapter 2

Conceptual framework & Literature review

Chapter 2
Conceptual framework & Literature review

2.1. Conceptual framework

Some related variables affect the occurrence of LBP among ICU nurses in Gaza governmental hospitals, include but not limited to demographic variables such as age, gender, years of experience and body mass index (BMI) of ICU nurse. Occupational factors such as long time awkward posture at work and heavy lifting contribute to the disease and raise the prevalence among ICU nurses.

Conceptual frame work consists of four categories, each of them represent a determinant that has been studied in this research. The first one is the demographic variables such as gender, age, years of experience, and BMI. The relation between age, gender, experience years, and the development of low back pain was examined to determine the statistical significance. Body mass index was estimated by a standard formula and was sorted in a questionnaire according to (WHO) standards.

The second category represents the work environment characteristics such as light, ventilation, body posture, overcrowding, awkward movements, noise, heavy lifting and along time standing. This determinant was studied by a direct question to subjects, then the assessment of work environment was done to evaluate the ICU is environment suited for work. The third one represents the risk factors of LBP. Some of the relevant risk factors can contribute to the causation of low back pain, such as heavy lifting, long time uncooperative position, bending and twisting, lifting heavy objects and lifting patients.

The fourth category represents knowledge about risk factors and for good practice to clarify if there is a gap between current position and results.

Figure (2.1): Conceptual Framework

Some related variables affect the occurrence of low back pain among ICU nurses in Gaza governmental hospitals, include but not limited to demographic variables such as age, gender, years of experience and body mass index of ICU nurse. Occupational factors such as long time awkward posture at work and heavy lifting contribute to the disease and raise the prevalence among ICU nurses.

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The fourth category represents knowledge about risk factors and for good practice to clarify if there is a gap between current position and results.

2.2. Introduction

Nurses play an important role within the hospitals by assisting the provision of health care. Also, they frequently assist patients to activities of daily living such as toileting and showering. Such activities as long time standing in an intensive care unit, long term posture and handling heavy machines and instruments also occupy an important factor in physical demand. Nurses and medical team have a lot of risk of herniated lumbar intervertebral discs and LBP requiring hospitalization in women. Furthermore, nurses in hospitals and residential care facilities lead all industries for workplace injury and illness (Bureau of Labour Statistics, 2019).

Several factors have been found to elevated nurses' risk such as LBP by work position to play a role, and psychosocial factors such as personality & presence of psychosomatic symptoms. Work-regulation and organizational factors have been shown to pose significant risks in individual studies, although when all studies are considered, the evidence is unreliable. Years in the nursing working may also be relevant, with a growing body of evidence suggesting that younger nurses are at greater risk. LBP have a significant effected on the efficiency of the nursing workforce. Nursing aides and assistants rank highest across all occupations for LBP involving days away from work in private industry (Bureau of Labour Statistics, 2019).

2.3. Historical background

Historically, the ICU was a place full of risks for both the patient and the caregiver. The primary hazards include, for example, fire, chemical exposure to therapeutic agents and direct exposure to radiation.

2.4. Classification of environmental hazards in ICU

A. Physical hazards: electrical, radiation, fall, noise pollution, irradiation.
B. Chemical hazards: carcinogens, mutagens, teratogens, liquids, cytotoxic drugs, and cleaning agents.
C. Biological hazards: insects, bacteria, needle-stick injuries.
D. Ergonomic hazards: repetitive motions, work pressure (Zarrini et al., 2018).

2.5. Definition of LBP

LBP that can relate to problems with the back (lumbar spine), the area between the vertebrae, the ligaments around the the spinal cord and a lot of nerves; muscles of the back & internal organs of the pelvis or the skin layer the lumbar area (Urits et al., 2019).

2.6. Anatomical Definition Low Back Pain

LBP is a syndrome of the lumbosacral spine and classification as acute or chronic, can be a debilitating condition for many patients. Chronic LBP is defined by its pain chronicity duration more than 12 weeks in. Treatment chronic LBP includes both pharmacologic and non-pharmacologic strategy (Urits et al., 2021).

2.7. Anatomy of the low back

The spinal cord in human terminates at the lumber1 (L1) to lumber2 (L2) level in a conical construction called the conus medullaris, which lies just caudad to the anatomical landmark of the 12th rib. The cauda equina contains a bundle of nerves which project distally within the enclosed cavity of the lumbar cistern from the spinal cord and conus medullaris toward the coccyx, Each nerve exits at its respective vertebral level toward targets which are supplied by the L2-S5 spinal cord level (figure 3.1) (Berg et al., 2021).
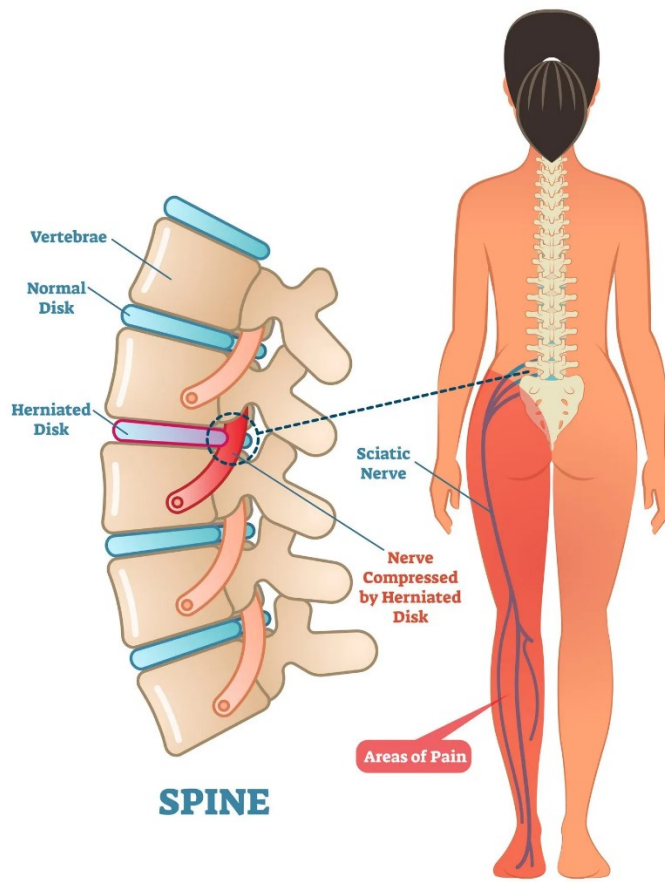
Figure (2.1): Anatomy of the low back (Allen r et al.,2009).

2.8. Pathophysiology

Pain is mediated by nociceptors, specialized peripheral sensory neurons that alert us to potentially damaging stimuli at the skin by transducing these stimuli into electrical signals that are relayed to higher brain centers. The spinal dorsal horn is a major site of integration of somatosensory information and is composed of several interneuron populations forming descending inhibitory and facilitatory pathways, able to modulate the transmission of nociceptive signals. Central sensitization is characterized by the increase in the excitability of neurons within the central nervous system, so that normal inputs begin to produce abnormal responses. Central sensitization occurs in a number of chronic pain disorders, LBP, osteoarthritis, fibromyalgia, headache, and lateral epicondylalgia. Despite improved knowledge of the processes leading to central sensitization. Peripheral and central sensitization have a key role in LBP chronification in fact, minimal changes in posture could easily drive long-lasting inflammation in the joints, ligaments, and muscles involved in the stability of the low back column, contributing to both peripheral

and central sensitization. Joints, discs, and bone are richly innervated by A delta fibers whose continuous stimulation could easily contribute to central sensitization (Allegri et al., 2016).

2.9. Clinical manifestations

The clinical manifestation consists of pain in the lumbar region, of sudden or slow installation, blocking the movements and determining an attitude of rigidity of the lumbar spine. Lumbago of mechanical origin can be caused by disorders in muscles, tendons, and ligaments. Usually, it can be attributed the activities such as lifting weights and remaining seated or standing for a prolonged time. Pain is reported as a weight and worsens by the end of the day due to the activities and the physical efforts. There are no neurological signs associated, and coughing or sneezing does not exacerbate symptoms. The onset is insidious, and the patient is usually sedentary, obese, with weak muscles of the lumbar spine and abdomen, buttocks, with shortening of the hamstring muscles (Almeida et al., 2017).

2.10 Classification of LBP

2.10.1 According to the duration of symptoms

2.10.1.1 Acute low back pain

Acute LBP is most often caused by a rapid injury to the muscles and ligaments supporting the back. The pain may be caused by muscle spasms or a strain or tear in the muscles and ligaments. Causes of sudden LBP include: Compression fractures to the spine from osteoporosis (Pengel et al., 2003).

2.10.1.2 Recurrent LBP

Recurrence of LBP is most common, with individuals having a recurrence during 12 months after recovery. Risk factors for a recurrence include exposure to longer time sitting, and more than two previous episodes, recurrences are whispered to be common and are likely to be accountable for much of the burden associated with LBP (da Silva et al., 2019).

2.10.1.3 Chronic low back pain

Chronic LBP is pain that continues for about 3 months longer, even after an start injury or underlying cause of acute LBP has been treated. About 20 % of people affected by acute LBP develop chronic LBP with persistent symptoms at one year,

chronic low back pain persisting 3 months or more, has been reported as 13.1% of the American population (Berenshteyn et al., 2019).

2.10.2 According to the cause

2.10.2.1 Nonspecific LBP

Chronic LBP is two categories: specific and nonspecific chronic LBP. Specific chronic LBP has obvious causes such as infection & tumor . about 85% of chronic LBP is nonspecific, intractable, and difficult to cure. It is a great challenge to clarify the specific causes of chronic LBP. With the development of technologies and diagnostic tests, risk factors can be identified in 92% of patients have chronic LBP. Nonspecific chronic LBP pointed out that prevalence of zygapophyseal joint pain & sacroiliac joint pain, while discogenic pain was 31% and 42%, respectively (M. J. DePalma et al., 2011).

2.10.2.2 Mechanical LBP

Mechanical LBP refers to pain that arises intrinsically from the spineor surrounding tissues. Mechanical LBP refers to pain that arises intrinsically from the spine or intervertebral disks tissues. This includes lumbosacral muscle strain in vertebral compression fractures. Both acute or chronic traumatic injury. Repetitive trauma are common causes of chronic LBP, which is often secondary to workplace injury. Most patients who experience activity-limiting low LBP go on to have recurrent episodes. Chronic LBP affects up to 23% of the population worldwide (Balagué F et al., 2012).

2.10.2.3 Diagnostic procedures for LBP

X-ray of the spine may illustrated a disclose marrow abnormalities while computed tomography (CT scan) useful in identifying underlying defect, such as obscure soft tissue lesions adjacent the vertebral column and vertebral disks defect , magnetic resonance imaging (MRI)and electromyogram (EMG) permits visualization of the nature and location of spinal pathology (Smeltzer & Bare, 2004).

2.11 Causes of LBP

The main causes of LBP are specific pain caused by a serious pathology tumor, fracture, infection, hematoma, and spinal stroke compressive radiculopathy, lumbar stenosis, damage to the facet joints or sacroiliac symphysis (Parvenu et al., 2020).

2.12. Factors that may contribute to LBP

LBP risk factors including gender, age, lifestyle, physical capacity, and Body mass index (BMI), hard manual work, heavy weight lifting, bending down or twisting, infection, tumor, osteoporosis, fracture, structural deformity, an inflammatory disorder and radicular pain that which can influence the results (Lee et al., 2021).

2.13 .Others factors include:

2.13.1 Age

Age is major contributing factor of acute and chronic LBP, and with the presence of flat feet, LBP is expected to be higher. The age factor has donated negatively in the prevalence of LBP in combination with the presence of flat foot. Regardless of any Body mass index category, flat feet were significantly with ALBP and chronic LBP and it is associated with LBP even after adjusting for weight. At the same time, the lose water from dick and become narrow, adding more pressure to the joints. (Almutairi et al., 2021).

2.13.2 Gender

Both male and female are risks of LBP up until age sixty years. The prevalence of LBP was higher among women (61%) than man (39%) ………… (Bento et al., 2020).

2.13.3 Diet

Protein is marker of chronic LBP. It appears that it is elevated in inflammatory LBP and associated with reduced pain thresholds and weakness while it may also contribute to peripheral sensitization as part of the progression towards and maintenance of chronic LBP. lifestyle of diet factors can promote raised LBP (Macphail et al., 2015).

2.14 Occupational risk factors

Mechanical workplace is first predict an elevated in the LBP whereas walking and cycling are significantly affected with reduced risk. Walking and cycling may have the potential to stop LBP (Shiri et al., 2019).

2.15 Cigarette smoking

smokers have a higher LBP than nonsmokers. The association is strongest for chronic LBP. The association between current smoking and the incidence of LBP is stronger in adolescents than in adults. Research is needed to more investigate whether smoking prevention or cessation is associated with reduced LBP (Shiri et al.,2010).

2.16 Management of LBP

The goals of treating chronic LBP often change over time and patients often have unrealistic expectations of complete pain relief and full return to their previous level of activity (YellandMJ et al.,2006) Documenting goals and expectations and revisiting them on follow-up visits may be helpful. Patients should receive information about effective self-care options and should be advised to remain active because muscles that do not move can eventually become hypersensitive to pain (Gourlay DL et al.,2005)
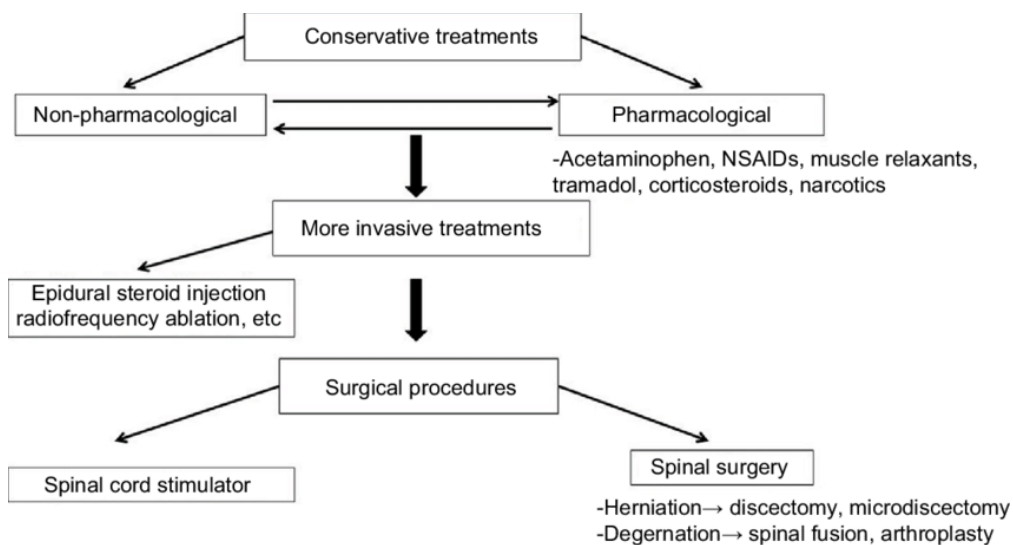
Figure (2.2): Management of LBP (Allen r et al.,2009).

2.16.1 Bed rest

Bed rest once a key part of treating LBP has a limited role in healing sore backs and bed rest can give a break when standing or sitting causes severe pain and most from staying in bed, limit the time patients are lying down to hour at a stretch. The patients have LBP can rest on a bed or sofa with comfortable position. To ease the strain on the patients back and they must try putting pillows under heads and between

the knees when lying on side, under knees when lying on back, and positions reduce forces that sitting or standing impose on the back especially on the discs and muscles.

2.16.2 Medication

LBP is treated in an orthopedic setting and though exercise-based rehabilitation is the standard of care for this patient, about 20% of patients currently participate in the physical therapy for isolation in most cases. LBP management includes pharmacologically such as pain management in the form of analgesic drugs because physical therapists are faced with the paradox that, although exercise under the influence of analgesic medications can impair muscle adaptation in healthy (Shahidi et al.,2021).

2.16.3 Physical therapy

Early physical therapy to treat LBP was strongly associated with lowering of lumbosacral injections, physician office visits for LBP, and lumbar surgery that compared with Physical Therapy that occurred at later period. A case-control study of active physical therapy care for acute and chronic LBP that reported an association between active physical therapy within 3 months of onset of acute LBP and decreased use of various healthcare resources including prescription medication. MRI and CT imaging, and epidural injections in the following discharge from physical therapy (Battié et al.,1994)

In LBP, guidelines promote the avoidance of bed rest with the continuation activities. The goal of physical treatments is to improve function and stope disability from getting worse. In chronic LBP, exercise therapy has become a first-line treatment and should be routinely used (Foster NE et al.,2018).

2.16.4 Massage therapy

Massage therapy is good choice to substantial healing and pain relief for many LBP when the correct muscle is targeted, the pain of LBP can be controlled at its source for pain relief. Clinical massage therapy refers to massage applied by trained massage experts and delivered within a professional. Therapeutic setting will be support functioning and optimal health (Elder et al.,2018).

2.16.5 Surgical treatments

Surgery treatments are severe LBP that does not get better after a first to fourth moth course of nonsurgical treatments. It is almost always the patient's decision to have back surgery, and only in rare situations is immediate surgery performed for LBP (Block et al.,2016).

2.17 Prevention of LBP

LBP due to muscle strain can be prevented by lifestyle, including exercise and body mass index control, avoiding smoking, and learning the proper techniques for lifting and moving heavy objects. Exercises designed to strengthen the muscles of the decrease LBP. Simple actions can also help lowering LBP, such as putting firm cushion behind the lower back when sitting for long intervals, using a good pillow for sleep that supports the lower neck without creating an unnatural angle for rest, using a swiveling desk chair with a postural support or stool that maintains the knees elevated level than the hips, standing on flexible rubber mats to avoid the effected of concrete floors at places of work for example, and wearing supportive and avoiding the use of high heels (Steffens et al.,2016).

2.18 LBP among nurses

LBP is first cause of morbidity among healthcare providers of which nurses are highly vulnerable due to the nature of their job. Nurses lift and transport patients in difficult situation especially in developing countries where lifting aides are very scarce or absent at all. LBP affects nurses' health as well as the quality of the care they provide (Mijena et al., 2020).

2.19 Risk factors for low back pain among nurses

Risk factors of LBP is most common among nurses. Standing for long time, lifting patients, sitting for long duration in high height chair for work, and activities that included bending or twisting are related to increased prevalence of LBP. The nurses who are working in areas like ICU, medicine & Orthopedics departments had higher prevalence of LBP (Nair et al., 2020).

2.20 The costs of LBP

Several studies showed that health care spending, revealed that LBP and neck pain accounted for the third highest amount of spending about $88 billion (United State Spending on Personal Health Care and Public Health, 2016).

LBP has an apparent affected on the all resource of work loss. However, the results of several studies indicate that there is a high short-term cost increase at the beginning of an LBP episode, but also that the costs decrease in the long term post the LBP symptoms have come to clinical attention (Olafsson et al.,2020).

2.21 Summary of literature review

Low-back pain (LBP) is common in the general people, disturbing different ages, has many risk factors. There are many conditions in the low back which may cause back pain, with muscular
or ligamentous strain, facet joint arthritis, or disc pressure on the annulus fibrosis, vertebral end-plate, or nerve roots. Numerous factors have been found to increase nurses' risk of back pain. Physical load and work posture play a role, as do psychosocial factors such as personality and the presence of psychosomatic symptoms. Work task and work organizational factors have been shown to be significant risks in individual studies, though when all trials are considered the evidence is inconsistent. Nursing qualifications are important, with nursing assistants at greater risk for back pain than registered nurses. Years in the nursing profession may also be relevant, with a growing body of evidence suggesting that younger nurses are at greatest risk. Identification of individual physical predictors of back pain is more elusive. Prospective studies find predominantly non-significant relationships or inconsistent results. However, reduced lateral bending of the spine has been identified as risk factor in two studies. Back pain and injury has a major impact on the efficiency of the nursing workforce. Registered nurses rank seventh and nursing aides and orderlies are highest ranked across all occupations for back injuries involving days away from work in private industry. Back injuries and resultant workers compensation claims in nurses are expensive.

Chapter 3
Methodology

Chapter 3
Methodology

3.1 Introduction

This chapter was address issues related to subject and methods used to answer the research hypothesis. The chapter commences with study design, target population, study setting, the study period, sample size, ethical consideration, data collection and data analysis.

3.2 Study design

The design is cross-sectional. This design is useful for describing the current study. It's relatively practical and manageable.

3.3 Study sample

The target population consists of all ICU nurses who are currently working in intensive care unit in Gaza governmental hospitals.

3.4 Sample size and sampling process

The sample of this study consisted of the whole population (census) 120 nurses, who are working in ICU at governmental hospitals in Gaza Strip .

3.5 Selection criteria

3.5.1   Inclusion criteria

Intensive care unit nurses who met the following criteria were included in the study:
- Working at Gaza governmental hospitals in intensive care unit (Males and Females).
- A registered nurse.
- Age from 20- 60 years old.
- At least 6 months experience in hospitals

3.5.2 Exclusion criteria

Intensive care unit nurses were excluded from the study:

- Working in Non-governmental hospitals, Military and police Medical Services.
- Working in another department from ICU.
- Any individuals who have a history of LBP (have LBP before getting this job).
- Have an experience less than 6month.
- Pregnant nurses.

3.6 Study Settings

This study was carried out at Gaza governmental hospitals in Gaza Al-Shifa medical complex, European Gaza Hospital, Al-Aqsa Martyrs Hospital, Indonesian Hospital, Nasser Medical Complex.

3.7 Period of the study

The study done from 5 March 2021 until 26 November 2021.

3.8 Pilot Study

The researcher conducted a pilot study on a sample of 20 participants, selected randomly from different ICU in the hospitals. No modification was done in the questionnaire after piloting and the pilot participants were included in the study.

3.9 Response rate

The number of respondents was 120 out of 135 (response rate was 96%), ten pregnant women were excluded, one participant who had LBP before getting ICU job.

3.10 Validity and reliability

3.10.1 Validity of the questionnaire

The amended questionnaire was reviewed by the supervisor and ten experts in the tendering and bidding environments to evaluate the procedure of questions and the method of analyzing the results. The experts agreed that the questionnaire was valid and suitable enough to measure the purpose that the questionnaire designed for (annex5).

3.11　Instrument of the study

The researcher was used self-administered report instrument (questionnaire) to be distributed for 120 nurses working in intensive care unit who are currently working in governmental hospitals in Gaza Strip during the time of the study.

3.12 Half- Split Method

As shown in table (3.1), the correlation between forms was 0.826 and Unequal Length Spearman-Brown Coefficient was 0.863 and finally, Guttman Split-Half Coefficient was 0.865. This result ensures the high reliability of the questionnaire.

Table (3.1): Split half for each field of the questionnaire

Split half		R
Correlation Between Forms		0.826
Spearman-Brown Coefficient	Equal Length	0.862
	Unequal Length	0.863
Guttman Split-Half Coefficient		0.865

3.13 Internal Consistency

Tables (3.2) through table (3.3) present the correlation coefficient (r) for each item of a domain and the total of the corresponding domain. The Pearson correlation coefficients of most items are significant at (P-values < 0.05).

Table (3.2): Correlation coefficient of each item of characteristics of LBP and the total of this domain

	Characteristics of LBP	
	R	P-value
Complaining of pain in the back	0.531	0.042[*]
I got sick leave due to LBP	0.854	0.000[*]
Complaining of alteration in sensation in lower extremities (paresthesia)	0.652	0.008*
Complaining of alteration in gait	0.884	0.000*
Low Back Pain starts during working hours	0.817	0.000*
Complaining of alteration in spinal mobility	0.693	0.004*
Onset of LBP is sudden	0.719	0.003*

Table (3.3): Correlation of each item of knowledge regarding safety measures to avoid LBP during work and the total of this domain

	Knowledge regarding safety measures to avoid LBP during work	
	R	P-value
Sustained trauma during work	0.330	0.003*
Uncomfortable chairs	0.220	0.047*
Prolonged time standing	0.352	0.001*
Sudden movements	0.382	0.002*
Bending and twisting	0.345	0.001*
Lifting heavy objects	0.217	0.049*
Work overload	0.523	0.000*
Wearing high heel shoes during work	0.661	0.000*
Unsuitable posture during work	0.639	0.031*
Working environment (light, ventilation, heat, noise and crowed)	0.776	0.000*
Lifting and transferring patients	0.750	0.000*
Holding an extremity during any procedure	0.769	0.000*

Table (3.4): Correlation coefficient of each domain and the total of these Domains

Domains	r	P-value
Characteristics of Low Back Pain (LBP)	0.882	0.000*
Risk factors of LBP	0.789	0.000*
Work environment characteristics	0.842	0.000*
Knowledge regarding safety measures to avoid LBP during work	0.840	0.000*
Total	0.912	0.000*

3.14 Reliability of the instrument

Table 3.5 shows the values of Chronbach's Alpha for each questionnaire domain of participants. The table illustrated the reliability of domains; values of Chronbach's Alpha were in the range from 0.817 and 0.933. Cronbach's alpha equals 0.851 for the entire questionnaire in pilot sample, which indicates good reliability of the entire questionnaire.

Table (3.5): Reliability of the research for each domain of the questionnaire

No.	Domains	No. of item	Cronbach's Alpha
1.	Characteristics of Low Back Pain (LBP)	7	0.898
2.	Risk factors of LBP	11	0.933
3.	Work environment characteristics	13	0.817
4.	Knowledge regarding safety measures to avoid LBP during work	11	0.826
	Total	**42**	**0.851**

3.15 Ethical Consideration and procedures

Ethical approval was obtained from Faculty of Nursing (Islamic University) and Helsinki Committee to carry out the study (see annexes). An approval latter was obtained from the general director of the hospitals, and consent form from the selected nurses who from the ICU departments were obtained to participate in the study.

3.16 Data entry and statistical analysis

The following steps were used in data entry

- Designing data entry model using the computer statistical package for social sciences (SPSS) and EXCEL software.
- Data was cleaned to ensure correct entry.

3.17 Reliability of the research

Table (3.6): Reliability of the research for each domain of the questionnaire

No.	Domains	No. of item	Cronbach's Alpha
1.	Characteristics of Low Back Pain (LBP)	7	0.898
2.	Risk factors of LBP	11	0.933
3.	Work environment characteristics	13	0.817
4.	Knowledge regarding safety measures to avoid LBP during work	11	0.826
	Total	**42**	**0.851**

Table 3.6 shows the values of Chronbach's Alpha for each questionnaire domain of participants. The table illustrated the reliability of domains; values of Chronbach's Alpha were in the range from 0.817 and 0.933. Cronbach's alpha equals 0.851 for the entire questionnaire in pilot sample, which indicates good reliability of the entire questionnaire.

3.18 Statistical methods are as follows:

The researcher used Statistical Package of Social Science (SPSS- version 25) program for data entry and analysis. Frequency tables and some statistical tests were used such as percentage (%), average and standard deviation (SD), independent t-test and One way analysis of variance (ANOVA) to determine whether there are any significant differences among the means. As well as the researcher used Person

correlation (r). Finally, Probability value (P-value) less than 0.05 was considered statistically significant.

3.19 Limitations of the Study

- Limited time
- Financial costs
- Transportation
- Frequent electricity cut off.

Chapter 4

Results and Discussion

Chapter 4
Results and Discussion

4.1 Sample distribution according to socio-demographic data

The present study is a cross-sectional study that included 120 subjects. The socio-demographic characteristics that were studied included gender, age group, education, marital status, BMI, place of work, years of experience in the intensive care unit, work overtime hours in this hospital, work overtime hours per week, number of shifts you involved with per week and pregnant status in female.

4.1.1 Distribution of the study sample according to their gender
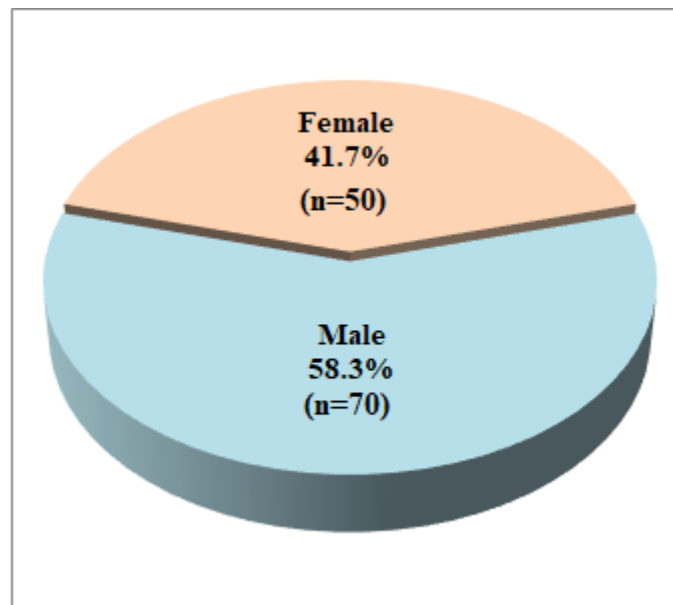
Figure (4.1): Distribution of study population according to their gender

Figure 4.1 pointed out the more than half of the study sample were males (58.3%) while 41.7% were females. These results agree with Nilsen et al., (2013) & Bruyneel et al., (2019) study that showed that the percentage of female approximately same in male and female among nurses worked in ICU, the Authors showed that nurses were evenly distributed between males (49%) and 51% females .

4.1.2   Distribution of the study sample according to their age
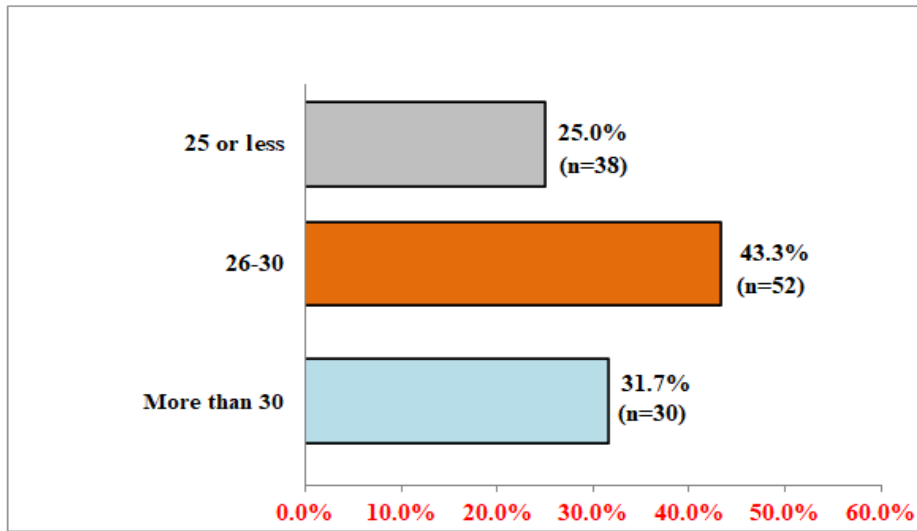
Figure (4.2): Distribution of study sample according to their age

Figure 4.2 illustrated that the highest age groups of the participants were aged between 26 to 30 years (43.3%) followed by 31.7% of them were aged 25 years or less. The results showed that the lowest age groups of study samples aged more than 35 years (25.0%). The average age among participants was 29.0±60 years. The result comes in line with local and international studies which showed their percentage participants of the age approximately same in age among nurses worked in ICU, the Authors showed that nurses were evenly distributed age Less than half (42.2%) of them were between the ages of 20 and 30 years (Jradi et al., 2020). Also, Nilsen et al. (2013) was studied nurse and patient characteristics and showed that the nurses (N = 30) ranged from 22 to 55 years of age (Mean±SD = 35.40±9.99).

4.1.3   Distribution of the study sample according to education levels
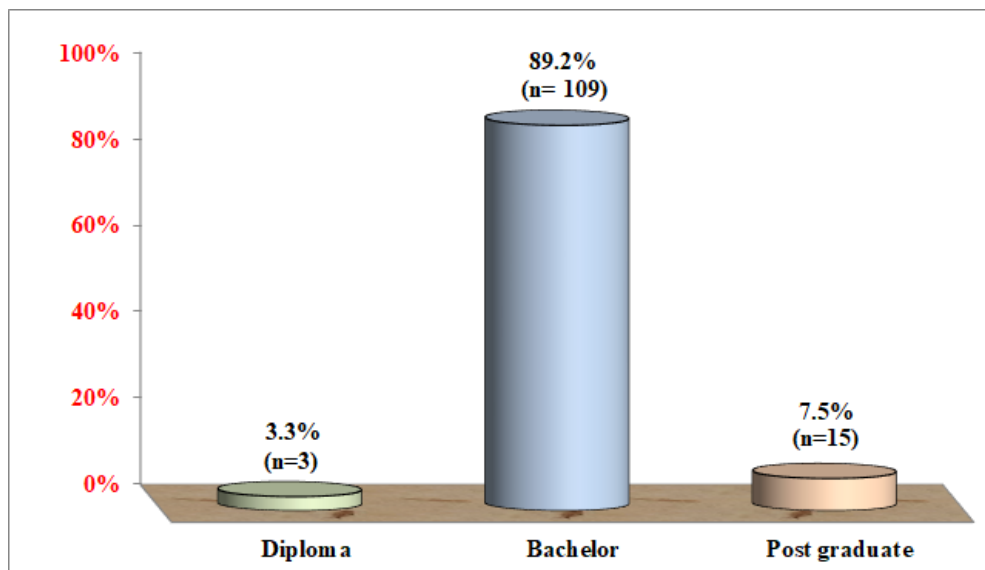
Figure (4.3): Distribution of study sample according to academic qualification

The distributions of the study sample according to academic qualification showed that only 3.3% of them have finished the diploma nursing program while the highest group of the study sample was finished the bachelor's degree (89.2%) and 7.5% of them have finished the master's degree. (Figure 4.3). . These results agree with another study that showed that the percentage of age approximately same in age among nurses worked in ICU, the Authors showed that the highest group of the study sample 97.2% had a bachelor degree and 2.8% had a master degree (Rahimi et al., 2015).

4.1.4 Distribution of the study sample according to their socio-demographic information

Table (4.1): Distribution of the study sample according to their socio-demographic information

Variables	Frequency (n)	Percentage (%)	Mean±SD
Marital status			
Single	38	31.7	
Married	79	65.8	
Divorced	3	2.5	
BMI			
Normal weight	67	55.8	
Overweight	38	31.7	
Obese	15	12.5	
Place of work			
Al-Shifa Medical complex	25	20.8	
Nasser Medical Complex	25	20.8	
European Gaza Hospital	25	20.8	
Al-Aqsa Martyrs hospitals	25	20.8	
Indonesian Hospital	20	16.8	
Years of experience in ICU			5.5±4.7
2 or less	40	33.3	
3-6	43	35.8	
More than 6	37	30.8	
Work overtime hours in hospital			
Yes	53	44.2	
No	67	55.8	
If yes, how many hours per week			9.7±6.7
Less than 10	31	58.5	
10 or more	22	41.5	
Number of shifts (rotation work pattern**) you involved per week**			
2	7	5.8	4.7 ±0.8
3	5	4.2	
4	11	9.2	
5	97	80.8	
Another job after your formal work			
Yes	21	17.5	
No	99	82.5	
Total	**120**	**100.0**	

BMI: Body mass index, **SD:** standard deviation

Table 4.1 illustrated that the majority of the study sample were married (65.8%) while 31.7% of them were single and 2.5% divorced. The distributions of the study sample according to BMI showed that more than half of participants 55.8% normal weight while 31.7% were overweight and 12.5% obese. The average BMI among participants was $25.0\pm 4.5kg/m^2$.

The distributions of the study sample according to hospitals showed that 20.8% of participants work in Al-Shifa Medical Complex, 20.8% of participants work in European Gaza Hospital, 20.8% of participants work in Nasser Medical Complex, 20.8% of them work in Al Aqsa Hospital, 16.7% them worked in Indonesian Hospital. The distributions of the study sample according to their years of experience showed that 33.3% of them have experience 2 years or less while 35.8% of them have experience from 3 to 6 years and 30.8% of them have experience more than 6 years. The average of experience years among participants was 5.5±4.7 years.

The results showed that 44.2% of the study sample have work overtime hours in the hospital while only 41.5% of them work overtime 10 hours or more while the average of overtime among participants was 9.7±6.7 hours per week. Regarding the number of shifts involved per week, the results showed that the majority of the study sample have 5 shifts per week (80.8%) followed by 9.2% of them have 5 shifts per week, 5.8% have 7 shifts per week and 4.2% have 3 shifts per week. The average shift number involved per week among participants was 4.7 ±0.8 shifts per week. Finally, the results showed that 17.5% of participants have another job after their formal work.

The result highlights that the majority of the study sample were married. This finding is consistent with a study (Fernandes al., 2018), the results showed that most of them participants were married and young adults. The results of the current study showed that more than half of participants were normal weight while 31.7% were overweight and 12.5% obese. This finding is consistent with a study (Großschädl, & Bauer, 2020) that conducted in Austria which aimed to examine the relationship between obesity and nursing care in intensive care and results of study showing 15% of nurses were were obese.

Regarding the experience of nursing the results showed that about one-third of participants have experience 2 years or less while 35.8% of them have experience from 3 to 6 years and 30.8% of them have experience more than 6 years and the average of experience was 5.5 years. This finding is consistent with a study (Najafi, 2021) which found that most of nurses in ICU department have experience less than 5 years and most of the participants had 1 - 10 years of work experience.

The current study showed that less than half participants have work overtime hours in the hospital and the average of overtime among participants was 9.7±6.7 hours per week. These results agree with another study that showed that the mean overtime hours per month was 72.23 ± 28.10, and most of the nurses had from 50 to 100 overtime hours per month (Ajri-Khameslou et al., 2021). On the other hand, the results showed that the majority of the study participants have 5 shifts (rotation work pattern) per week (80.8%) and This result is consistent with a study (Ningrum, et.al, 2019) which showed that most of Indonesian nurses have rotation work pattern.

Finally, the results showed that 17.5% of participants have another job after their formal work.This finding is consistent with studies done in the ICU of a University Hospital in the Northeast of Brazil and that revealed that less than 20% of the nurses have another job.

4.2 Distribution of the study sample according to their complain of low back pain

Table (4.2): Distribution of the study sample according to their complaint of low back pain

Variable	Frequency (n)	Percentage (%)
Complain of low back pain		
Yes	82	68.3
No	38	31.7
Total	**120**	**100.0**

The distribution of the study sample according to their complaint of low back pain showed in Table 4.2. The results showed that 82 (68.3%) of participants are complaining of low back pain while 31.7% do not complain of low back pain. This result because high workload. This result is consistent with Yosefaljeesh , Samer al Nawajha (2011) studying which showed that there are 101 (70.6%) of the study sample of operating room nurses were complaining of LBP, 42 (29.4%) were not complaining of LBP.

4.3 Scores of items measuring nurses' characteristics of low back pain

Table (4.3): Scores of items measuring nurses' characteristics of low back pain

No	Items	Mean	SD	% mean	Rank
1.	Complaining of pain in the back	2.56	0.88	64.02	1
2.	I got sick leave due to LBP	1.26	0.60	31.40	7
3.	Complaining of alteration in sensation in lower extremities (paresthesia)	1.68	0.81	42.07	5
4.	Complaining of alteration in gait	1.70	0.90	42.38	4
5.	LBP starts during working hours	2.30	0.96	57.62	2
6.	Complaining of alteration in spinal mobility	1.54	0.79	38.41	6
7.	Onset of LBP is sudden	2.20	0.87	54.88	3
	Total	**1.84**	**0.57**	**45.93**	

SD: standard deviation & **LBP**: Characteristics of low back pain

The distribution of the participants according to their responses about their nurses' characteristics of low back pain is ranked and pointed out in Table 4.3. According to the results, the highest paragraph was number (1) " *Complaining of pain in the back* " with a percentage of 64.02%, followed by the paragraph number (5) " *LBP starts during working hours* " with a percentage 57.62%. While the lowest paragraph was number (2) " *I got sick leave due to LBP* " with a percentage of 31.40% followed by paragraph number (6) " *Complaining of alteration in spinal mobility* " with a percentage 38.41%. The total score of items measuring nurses' characteristics of low back pain is 45.93%. This finding is consistent with study done in Turkey by Rochman et al., (2019) revealed the LBP on Functional Disability Level in Nurses Working in a University Hospital and results showed that 55.4% of the nurses had low back pain at any stage of their life and majority of the nurses' experiences mild disability. Another study showed that complaining of pain in the back among nurses was 73.8% (Qareeballa et al., 2018). According of researcher observational there results illustrated that low scores of items measuring nurses' characteristics of low back pain because some nurses was old and females which overload hardly in hospitals, home and others have private work.

4.4 Distribution of the study sample according to their severity and radiating of low back pain

Table (4.4): Distribution of the study sample according to their severity and radiating of low back pain

Variables	Frequency (n)	Percentage (%)
The severity of pain is described as		
Mild	14	17.1
Moderate	52	63.4
Severe	16	19.5
Complaining of pain radiating/radiated down to		
Right leg	10	12.2
Left leg	12	14.6
Both legs	29	35.4
Not radiate	31	37.8

The distribution of the study sample according to their severity and radiating of low back pain showed in Table 4.4. The results showed that more the majority of the grade of low back pain is moderate (63.4%) followed by 18.3% severe, 17.1% mild, and only 1.7% very severe. These results showed that highest group of study sample was moderate LBP and complaining of pain radiating down to both legs because more than half of them aged less than 30 years. Regarding pain radiating/radiated, the results showed that the highest group was not radiated (37.8%) followed by 35.4% radiated to both legs, 14.6% radiated to left legs and 12.2% radiated to the right leg. The result is consistent with studies conducted in hospital in the West of Turkey (Pour et al., 2016) and the study showed LBP is a common disorder that causes disability and absence from work among nurses in ICU and 88.2% of nurses had LBP and the mean severity of LBP was 2.84±1.44 while emergency and general surgery ICU nurses had the highest severity of LBP. The prevalence of LBP among nurses was high and the average severity of LBP was mild. Also, the current results agree with Pandey (2021) which were studied that LBP severity among staff nurses of Lumbini Provincial Hospital Nepal and the authors showed that the prevalence of low back pain in both legs and its associated risk factors.

4.5 Distribution of the study sample according to their pain nature and duration

Table (4.5): Distribution of the study sample according to their pain nature and duration

Variables	Frequency (n)	Percentage (%)
Pain Nature		
Numbness	15	18.3
Burning	10	12.2
Tingling	11	13.4
Stiffness	31	37.8
Not clear	15	18.3
Pain duration		
Continuous	9	11.0
Intermittent	49	59.8
Hours	20	24.4
Weeks	2	2.4
Months or more	2	2.4

The distribution of the study sample according to their pain nature and duration showed in Table 4.5. The results showed that more the majority of the pain nature is stiffness (37.8%) followed by 18.3% numbness, 18.3 not clear, 13.4% tingling and 12.2% burning. The results showed that highest group have stiffness pain because long standing time with elevated workload. Regarding of pain duration, the results showed that the highest group among the study sample was intermittent pain (59.8%) followed by 24.4% feeling pain during hours, 11.0% of them have continuous pain and 2.4% feeling pain during weeks and 2.4% feeling pain during the month or more. This result is consistent with a study (Amin et al., 2018) which showed that the participants were requested pain nature as numbness, tingling, aching, stiffness, and burning, respectively. Also, this result is consistent with the study (Menzel et al., 2016) which revealed Most of nursing have intermittent LBP and brief exposure to patient handling activities.

4.6 Scores of items measuring nurses' risk factors of low back pain

Table (4.6): scores of items measuring nurses' risk factors of low back pain

Items	Yes		No		Rank
	n	**%**	**n**	**%**	
13. Sustained trauma during work	10	12.2	72	87.8	12
14. Uncomfortable chairs	65	79.3	17	20.7	8
15. Prolonged time standing	80	97.6	2	2.4	1
16. Sudden movements	72	87.8	10	12.2	7
17. Bending and twisting	77	93.9	5	6.1	2
18. Lifting heavy objects	76	92.7	6	7.3	3
19. Work overload	75	91.5	7	8.5	4
20. Wearing high heel shoes during work	13	15.9	69	84.1	11
21. Unsuitable posture during work	46	56.1	36	43.9	10
22. Working environment (light, ventilation, heat, noise and crowed)	52	63.4	30	36.6	9
23. Lifting and transferring patients	75	91.5	7	8.5	4
24. Holding an extremity during any procedure	73	89.0	9	11.0	6
Total	**72.6**		**27.4**		

n: number of the subjects

The distribution of the participants according to their responses about their nurses' risk factors of low back pain is ranked and pointed out in Table 4.6. According to the results, the highest paragraph was number (15) " Prolonged time standing " with a percentage of 97.6%, followed by the paragraph number (17) " Bending and twisting " with a percentage 93.9%. While the lowest paragraph was the number (13) " Sustained trauma during work " with a percentage of 12.2% followed by the paragraph number (20) " Wearing high heel shoes during work " with a percentage of 15.9%. The total score of items measuring nurses' risk factors of low back pain is 72.6%. This finding is agreed with study other studies about 80% of the nurses had low back pain (Rochman et al., 2019& Qareeballa et al., 2018). And these study reported a high prevalence of low back pain.

4.7 Scores of items measuring nurses' work environment characteristics

Table (4.7): scores of items measuring nurses' work environment characteristics

Items	Yes		No		Rank
	N	**%**	**n**	**%**	
25. Is there enough lighting in your workplace?	110	91.7	10	8.3	1
26. Is there good ventilation in your workplace?	81	67.5	39	32.5	5
27. Is there good air conditioning to maintain proper intensive care unit temperature in your workplace?	89	74.2	31	25.8	4
28. Are the chairs comfortable chairs?	34	28.3	86	71.7	11
29. Is the floor sloppy?	93	77.5	27	22.5	2
30. Is there much furniture that restricts your free movement?	59	49.2	61	50.8	9
31. Are there wheels and other heavy devices to move heavy equipment?	69	57.5	51	42.5	6
32. Are high monitoring devices, machines, and tool kits comfortable for you?	62	51.7	58	48.3	8
33. Is your workplace crowded?	69	57.5	51	42.5	6
34. Are there mechanical devices for patient lifting?	24	20.0	96	80.0	12
35. Are there Adequate staffing?	45	37.5	75	62.5	10
36. Are there rails ramps to minimize awkward movements?	24	20.0	96	80.0	12
37. Is your work place noisy?	90	75.0	30	25.0	3
Total	**54.4**		**45.6**		

n: number of the subjects

The distribution of the participants according to their responses about their nurses' work environment characteristics is ranked and illustrated in Table 4.7. According to the results, the highest paragraph was number (25) " Is there enough lighting in your workplace?" with a percentage of 91.7%, followed by the paragraph number (29) " Is the floor sloppy?" with a percentage 77.5%. While the lowest paragraph was number (34) " Are there mechanical devices for patient lifting? " with a percentage of 20.0% and the paragraph number (36) " Are there rails ramps to minimize awkward movements?" with a percentage of 20.0%. The total scores of items measuring nurses' work environment characteristics are 72.6%. According to the findings of the current study, the total scores of items measuring nurses' work environment characteristics 54.4%. This indicated that low quality of work environment in ICU and this agreement with another study by Luetz et al., (2016).

4.8 Scores of items measuring nurses' knowledge regarding safety measures to avoid LBP during work

Table (4.8): scores of items measuring nurses' knowledge regarding safety measures to avoid LBP during work

Items	Yes		No		Rank
	N	%	n	%	
38. Sitting properly on chair will reduce pain	113	94.2	7	5.8	3
39. Handling instruments / equipment properly will reduce pain	106	88.3	14	11.7	6
40. Sitting in one place for long time may increase your pain	105	87.5	15	12.5	8
41. Bending for long time may increase your pain	115	95.8	5	4.2	1
42. Stretching your body intermittently may decrease your pain	106	88.3	14	11.7	6
43. Sudden movements may increase your pain	114	95.0	6	5.0	2
44. Wearing high heel shoes during work may increase your pain	110	91.7	10	8.3	5
45. Fluctuating room temperature may increase your pain	86	71.7	34	28.3	11
46. Noise and crowed at work place may increase your pain	98	81.7	22	18.3	10
47. Presence of wheels and other heavy devices to move heavy equipment and patients will reduce LBP	112	93.3	8	6.7	4
48. Ergonomic design of ICU will decrease the pain such as rails or ramps.	102	85.0	18	15.0	9
Total	**88.4**		**11.6**		

n: number of the subjects

The distribution of the participants according to their responses about their nurses' knowledge regarding safety measures to avoid LBP during work is ranked and detected in Table 4.8. According to the results, the highest paragraph was number (41) " Bending for a long time may increase your pain " with a percentage of 95.8%, followed by the paragraph number (43) " Sudden movements may increase your pain " with a percentage 95.0%. While the lowest paragraph was number (45) " Fluctuating room temperature may increase your pain " with a percentage of 71.7%. followed by paragraph number (46) "Noise and crowed at workplace may increase your pain " with a percentage 81.7%. The total score of items measuring nurses' knowledge regarding safety measures to avoid LBP during work is 88.4%. Similar findings were reported by previous studies in different countries (Luetz et al., 2020; Rayan et al., 2021 & Sharaf et al., 2021) indicating the most nurses have good knowledge regarding safety measures to avoid LBP during work because nurses are required to respond immediately to emergency situations in ICU and knowledge regarding safety measures will lead to avoid LBP severity.

4.9 Scores of items measuring nurses' suggestions/ recommendations to reduce pain

Table (4.9): scores of items measuring nurses' suggestions/recommendations to reduce pain

Items	Mean	SD	% mean	Rank
1. Reduce working hours	3.88	3.08	38.75	10
2. Reduce number of shifts per week	3.95	2.63	39.50	9
3. Practice some exercises during work	7.19	2.73	71.92	1
4. Wear comfortable shoes / clothes during work	4.52	2.79	45.17	8
5. Avoid sudden movements	4.73	2.47	47.33	6
6. Change work position frequently	6.28	1.91	62.83	4
7. Stop working when pain starts	5.98	2.15	59.83	5
8. Provide adequate staffing in ICU	4.68	2.80	46.83	7
9. Providing comfortable and suitable chairs for ICU nurses	6.85	2.24	68.50	3
10.Using lifting assistance devices to help lift and move patients, also to help lift heavy equipment	6.93	3.07	69.25	2
Total	5.50	2.59	54.99	

SD: Standard deviation ,Max=10 score

The distribution of the participants according to their responses about their nurses' suggestions/recommendations to reduce pain is ranked and pointed out in Table 4.9. According to the results, the highest paragraph was number (3) " Practice some exercises during work " with a percentage of 71.92%, followed by the paragraph number (10) " Using lifting assistance devices to help lift and move patients, also to help lift heavy equipment " with percentage 68.50%. While the lowest paragraph was the number (1) " Reduce working hours " with a percentage of 38.75% followed by the paragraph number (2) " Reduce the number of shifts per week " with a percentage 39.50%. The total score of measuring nurses' suggestions/recommendations to reduce pain is 55%. There finding agreed with others reported by previous studies (Hancock et al., 2007; Buchbinder et al., 2020; Licciardone et al., 2021 & de Zoete et al., 2021) indicating the most Evidence- recommendations to reduce pain including diagnostic and practice some exercises during work, using lifting assistance devices to help lift and move patients, also to help lift heavy equipment, providing comfortable and suitable chairs for ICU nurses, change work position frequently, stop working when pain starts, avoid sudden movements, provide adequate staffing in ICU, wear comfortable shoes / clothes during work, reduce number of shifts per week and reduce working hours.

4.10 Scores of studied domains measuring low back pain

Table (4.10): Scores on domains measuring nurses' practice

No	Domain	% Mean	SD	Rank
1.	Characteristics of LBP	45.94	14.20	4
2.	Risk factors of LBP	72.54	14.50	2
3.	Work environment characteristics	52.97	17.56	3
4.	Knowledge regarding safety measures to avoid LBP during work	88.52	14.22	1
	Total	**66.90**	**8.83**	

SD: standard deviation

Table 4.10 illustrated the distribution of the participants according to their responses about their scores of studied domains measuring low back pain. According to the results, the highest domain was the number (4) " Knowledge regarding safety measures to avoid LBP during work " with a percentage of 88.40% , followed by the domain number (2) " Work environment characteristics " with a percentage 72.56% . While the lowest domain was number (1) "Work environment characteristics " with a percentage of 45.93% followed by the domain number (3) " Work environment characteristics " with a percentage 52.92%. The total score of items measuring nurses' scores of studied domains measuring nurses' practice is 66.90%. There finding agreed with others reported by previous studies (Eilayyan et al., Inman et al., 2019; Maselli et al., 2021 & Minghelli et al., 2021) indicating the knowledge regarding safety measures to avoid LBP during work is high while low level characteristics and risk factors in low back pain.

4.11 Mean difference of studied domains related to the gender

Table (4.11): Mean difference of studied domains related to the gender

Domains	Gender	N	Mean	SD	t	P-value
Characteristics of Low Back Pain	Male	44	42.44	11.82	2.475	0.015
	Female	38	49.99	15.74		
Risk factors of LBP	Male	44	73.07	12.66	0.355	0.723
	Female	38	71.92	16.53		
Work environment characteristics	Male	70	51.84	19.12	-0.829	0.409
	Female	50	54.54	15.15		
Knowledge regarding safety measures to avoid LBP during work	Male	70	89.19	15.03	0.608	0.544
	Female	50	87.58	13.10		
Total	Male	70	66.72	9.21	-0.270	0.787
	Female	50	67.16	8.36		

[*]P≤0.05: Significant, P>0.05: Not significant; **n**: number of the subjects; **SD:** standard deviation; & **t:** independent t-test.

Table 4.11 showed the mean difference of studied domains related to the gender. The results showed that males higher statistically significant than males in characteristics of low back pain scores (P<0.05). While the results showed that there is no statistically significant difference in the mean of work environment characteristics, knowledge regarding safety

measures to avoid LBP during work and domains as total between males and females (P>0.05). There results pointed out that both gender have same workload and same environment work in governmental hospitals in last years with elevated workload by COVID19 pandemic. The result is consistent with studies (Aljeesh & Nawajha 2011; 2018; Asadi et al., 2016 and Shariat et al., 2018) which showed the There were no statistical significant differences between gender and LBP among nurses.

4.12 Mean difference of studied domains related to their age groups

Table (4.12): Mean difference of studied domains related to their age groups

Domains	Age (years)	N	Mean	SD	F	P-value
Characteristics of Low Back Pain (LBP):	25 or less	19	46.21	13.90	0.181	0.835
	26-30	35	44.89	15.50		
	More than 30	28	47.05	13.08		
	Total	82	45.94	14.20		
Risk factors of LBP	25 or less	19	71.89	18.72	0.027	0.974
	26-30	35	72.60	12.52		
	More than 30	28	72.89	14.11		
	Total	82	72.54	14.50		
Work environment characteristics	25 or less	30	53.67	20.74	0.053	0.949
	26-30	52	52.40	17.71		
	More than 30	38	53.18	14.88		
	Total	120	52.97	17.56		
Knowledge regarding safety measures to avoid LBP during work	25 or less	30	85.90	15.80	1.763	0.176
	26-30	52	87.52	15.62		
	More than 30	38	91.95	9.99		
	Total	120	88.52	14.22		
Total	25 or less	30	66.84	9.71	0.464	0.630
	26-30	52	66.16	8.89		
	More than 30	38	67.98	8.14		
	Total	120	66.90	8.83		

[*]$P \leq 0.05$: Significant, $P>0.05$: Not significant; **n**: number of the subjects; **SD:** standard deviation & **F**: one-way ANOVA.

The mean difference of studied domains related to age groups is pointed out in table 4.12. The one-way ANOVA test showed there is no statistically significant difference between means of risk factors of LBP, work environment characteristics, knowledge regarding safety measures to avoid LBP during work and domains as total related to the age groups (P>0.05). The result is consistent with studies (Suliman, 2018; Jradi et al., 2020 and Khalid et al., 2021) which showed the There were no statistical significant differences between gender and LBP among nurses. In contrast, the result is disagreed with others studies (Tefera et al., 2021 and Choobineh, 2021) which showed that there is a positive association between low back pain and increase of age.

4.13 Mean difference of studied domains related to their education levels

Table (4.13): Mean difference of studied domains related to their LBP levels domains related to education levels

Domains	Education levels	N	Mean	SD	F	P-value
Characteristics of low back pain	Diploma	4	41.94	16.13	0.164	0.849
	Bachelor	74	46.13	14.25		
	Post graduate	4	46.38	14.89		
	Total	82	45.94	14.20		
Risk factors of LBP	Diploma	4	58.25	24.46	2.320	0.105
	Bachelor	74	73.51	13.69		
	Post graduate	4	68.75	14.10		
	Total	82	72.54	14.50		
Work environment characteristics	Diploma	4	35.25	16.94	3.423	0.036
	Bachelor	107	52.85	17.52		
	Post graduate	9	62.22	12.52		
	Total	120	52.97	17.56		
Knowledge regarding safety measures to avoid LBP during work	Diploma	4	75.25	28.81	2.469	0.089
	Bachelor	107	88.55	13.83		
	Post graduate	9	94.00	6.36		
	Total	120	88.52	14.22		
Total	Diploma	4	52.67	13.06	8.289	0.000
	Bachelor	107	66.92	8.17		
	Post graduate	9	73.07	8.25		
	Total	120	66.90	8.83		

[*]P≤0.05: Significant, P>0.05: Not significant; **n**: number of the subjects; **SD:** standard deviation & **F**: one-way ANOVA.

The mean difference of studied domains related to education levels is summarized in table 4.13. The one-way ANOVA test showed there is a statistically significant difference between means of work environment characteristics related to education levels (P<0.05). According to the findings of the current study, it was remarkable relation between LBP and educational levels and the result is agreement with studies (Güneş, & Ayaz-Alkaya, 2021; Van Hoof et al., 2021) which showed in meta-analysis to quantify the risk factors for LBP in nurses the were statistically significant relation between education levels and LBP.

4.14 Post Hoc test of mean difference of work environment characteristics and domains as total related to their education levels

Table (4.14): Post Hoc test of mean difference of work environment characteristics and domains as total related to their education levels

Dependent Variable			Mean Difference (I-J)	Std. Error	P-value	95% Confidence Interval	
						Lower Bound	Upper Bound
Work environment characteristics	Diploma	Bachelor	-17.60	8.76	0.047*	-34.96	-0.24
		Post graduate	-26.97	10.34	0.010*	-47.46	-6.49
	Bachelor	Diploma	17.60	8.76	0.047*	0.24	34.96
		Post graduate	-9.37	5.97	0.119	-21.20	2.46
	Post graduate	Diploma	26.97	10.34	0.010*	6.49	47.46
		Bachelor	9.37	5.97	0.119	-2.46	21.20
Total	Diploma	Bachelor	-14.25	4.25	0.001*	-22.65	-5.84
		Post graduate	-20.40	5.01	0.000*	-30.32	-10.48
	Bachelor	Diploma	14.25	4.25	0.001*	5.84	22.65
		Post graduate	-6.15	2.89	0.036*	-11.88	-0.42
	Post graduate	Diploma	20.40	5.01	0.000*	10.48	30.32
		Bachelor	6.15	2.89	0.036*	0.42	11.88
*. The mean difference is significant at the 0.05 level.							

The post hoc test (LSD) in Table 4.14 showed that the average of work environment characteristics among those who have diploma degree is lower statistically significant compared to those who have bachelor and postgraduate degree (P<0.05). In contrast, the results showed that there is no statistically significant difference between the average of work environment characteristics regarding other education levels (P>0.05). By the same away, the post hoc test (LSD) in the table. showed that the average of the domain as total among those who have to the postgraduate degree is higher statistically significant compared to those who have bachelor and diploma degrees (P<0.05). Also, the average of the domain as total among those who have bachelor degrees is higher statistically significant compared to those who have diploma degrees (P<0.05). In contrast, the results showed that there is no statistically significant difference between the average of others domains regarding education levels (P>0.05). The result is consistent with studies by Rahimi et al., (2015) that studied one hundred and eighty registered nurses working as EMTs at the Hamadan Emergency Medical Center were selected by consensus and authors showed that diploma degree is lower statistically significant compared to those who have bachelor and postgraduate degree (P<0.05).

4.15 Mean difference of studied domains related to the marital status

Table (4.15): Mean difference of studied domains related to the marital status

Domains	Marital status	N	Mean	SD	t	P-value
Characteristics of low back pain	Single	24	47.47	16.17	0.769	0.444
	Married	57	44.84	13.06		
Risk factors of LBP	Single	24	73.96	13.50	0.498	0.620
	Married	57	72.19	14.98		
Work environment characteristics	Single	38	51.32	18.83	-0.611	0.542
	Married	79	53.44	17.04		
Knowledge regarding safety measures to avoid LBP during work	Single	38	86.03	15.04	-1.193	0.235
	Married	79	89.39	13.93		
Total	Single	38	66.00	8.89	-0.536	0.593
	Married	79	66.91	8.59		

[*]$P \leq 0.05$: Significant, $P > 0.05$: Not significant; **n**: number of the subjects; **SD:** standard deviation; & **t:** independent t-test.

Table 4.15 showed the mean difference of studied domains related to the marital status-related. The results showed that there is no statistically significant difference in the mean of work characteristics of low back pain, environment characteristics, knowledge regarding safety measures to avoid LBP during work, and domains as total between single and married ($P > 0.05$). The result is disagreed with others studies (June & Cho, 2018 and Almaghrabi, A., & Alsharif, 2021) which showed single nurses tended to have a higher prevalence rate than those who were married

4.16 Mean difference of studied domains related to their body mass index

Table (4.16): Mean difference of studied domains related to their BMI domains related to BMI

Domains	BMI	N	Mean	SD	F	P-value
Characteristics of low back pain	Normal weight	44	44.31	13.87	1.476	0.235
	Overweight	30	46.28	12.55		
	Obese	8	53.59	20.39		
	Total	82	45.94	14.20		
Risk factors of LBP	Normal weight	44	72.70	15.62	0.011	0.989
	Overweight	30	72.47	14.38		
	Obese	8	71.88	8.71		
	Total	82	72.54	14.50		
Work environment characteristics	Normal weight	67	55.96	17.73	5.862	0.004
	Overweight	38	45.34	16.93		
	Obese	15	58.93	11.93		
	Total	120	52.97	17.56		
Knowledge regarding safety measures to avoid LBP during work	Normal weight	67	86.84	14.81	2.468	0.089
	Overweight	38	92.66	10.84		
	Obese	15	85.53	17.48		
	Total	120	88.52	14.22		
Total	Normal weight	67	67.32	9.71	1.506	0.226
	Overweight	38	65.14	7.05		
	Obese	15	69.53	8.40		
	Total	120	66.90	8.83		

[*]$P \leq 0.05$: Significant, $P > 0.05$: Not significant; **n**: number of the subjects; **SD:** standard deviation; **BMI**: Body mass index & **t:** independent t-test.

The mean difference of studied domains related to body mass index is summarized in table 4.17. The one-way ANOVA test showed there is a statistically significant difference between means of work environment characteristics related to body mass index (P<0.05). In contrast, the results showed that there is no statistically significant difference between the average work environment characteristics regarding others BMI groups (P>0.05). The results showed that there is no statistically significant difference between the average of others domains regarding BMI (P>0.05). The result is disagreed with others studies (Sharaf et al., 2021 and Alziyadi et al., 2021) which showed highlighted statistically significant associations between body mass index. The different in results may be due to different in sample size and sample.

4.17 Post Hoc test of mean difference of work environment characteristics related to their BMI

Table (4.17): Post Hoc test of mean difference of work environment characteristics related to their BMI

Dependent Variable			Mean Difference (I-J)	Std. Error	P-value	95% Confidence Interval	
						Lower Bound	Upper Bound
Work environment characteristics	Normal weight	Overweight	10.61	3.43	0.002	3.82	17.40
		Obese	-2.98	4.82	0.538	-12.53	6.57
	Overweight	Normal weight	-10.61	3.43	0.002	-17.40	-3.82
		Obese	-13.59	5.15	0.009	-23.79	-3.40
	Obese	Normal weight	2.98	4.82	0.538	-6.57	12.53
		Overweight	13.59	5.15	0.009	3.40	23.79
*The mean difference is significant at the 0.05 level.							

The post hoc test (LSD) in Table 4.17 showed that the average of work environment characteristics among those who have overweight is lower statistically significant compared to those who are obese and normal weight (P<0.05). The result is disagreed with others studies (Sharaf et al., 2021 and Alziyadi et al., 2021) which showed highlighted statistically significant associations between body mass index. The different in results may be due to different in sample size and sample.

4.18 Mean difference of studied domains related to their experience years in the intensive care unit

Table (4.18): Mean difference of studied domains related to their years of experience in the intensive care unit

Domains	Years of experience	N	Mean	SD	F	P-value
Characteristics of low back pain	2 or less	30	44.76	15.17	0.991	0.376
	3-6	25	43.98	12.75		
	More than 6	27	49.06	14.37		
	Total	82	45.94	14.20		
Risk factors of LBP	2 or less	30	69.17	17.12	1.471	0.236
	3-6	25	73.24	12.27		
	More than 6	27	75.63	12.86		
	Total	82	72.54	14.50		
Work environment characteristics	2 or less	40	55.45	19.73	0.695	0.501
	3-6	43	52.53	17.44		
	More than 6	37	50.78	15.19		
	Total	120	52.97	17.56		
Knowledge regarding safety measures to avoid LBP during work	2 or less	40	84.25	16.27	2.995	0.054
	3-6	43	89.72	14.60		
	More than 6	37	91.73	10.04		
	Total	120	88.52	14.22		
Total	2 or less	40	65.05	10.05	1.504	0.226
	3-6	43	67.30	7.82		
	More than 6	37	68.45	8.41		
	Total	120	66.90	8.83		

[*]P≤0.05: Significant, P>0.05: Not significant; **n**: number of the subjects; **SD:** standard deviation; & **t:** independent t-test.

The mean difference of studied domains related to years of experience in intensive care unit is pointed out in table 4.18. The one-way ANOVA test showed there is no statistically significant difference between means of risk factors of LBP, work environment characteristics, knowledge regarding safety measures to avoid LBP during work, and domains as total related to the years of experience in an intensive care unit (P>0.05). The result is disagreed with others studies (Tefera et al., 2021 and Choobineh, 2021) which showed that there is a positive association between low back pain domain and work experience.

4.19 Mean difference of studied domains related to their hospitals

Table (4.19): Mean difference of studied domains related to their hospitals

Domains	Hospitals	N	Mean	SD	F	P-value
Characteristics of low back pain	Al Shifa Medical complex	18	49.19	17.61	0.310	0.870
	Nasser Medical Complex	17	44.91	15.07		
	European Gaza Hospital	17	45.18	14.40		
	Al-Aqsa Martyrs hospitals	18	44.44	9.95		
	Indonesian Hospital	12	45.81	14.05		
	Total	82	45.94	14.20		
Risk factors of LBP	Al Shifa Medical complex	18	79.11	9.62	1.781	0.141
	Nasser Medical Complex	17	68.59	17.26		
	European Gaza Hospital	17	68.18	13.85		
	Al-Aqsa Martyrs hospitals	18	72.17	17.51		
	Indonesian Hospital	12	75.00	9.35		
	Total	82	72.54	14.50		
Work environment characteristics	Al Shifa Medical complex	25	47.40	16.51	2.106	0.085
	Nasser Medical Complex	25	56.40	15.23		
	European Gaza Hospital	25	59.32	19.49		
	Al-Aqsa Martyrs hospitals	25	52.40	19.25		
	Indonesian Hospital	20	48.40	14.63		
	Total	120	52.97	17.56		
Knowledge regarding safety measures to avoid LBP during work	Al Shifa Medical complex	25	89.20	14.47	0.386	0.818
	Nasser Medical Complex	25	88.44	17.46		
	European Gaza Hospital	25	87.76	14.67		
	Al-Aqsa Martyrs hospitals	25	86.32	13.78		
	Indonesian Hospital	20	91.45	9.45		
	Total	120	88.52	14.22		
Total	Al Shifa Medical complex	25	67.11	8.60	0.102	0.982
	Nasser Medical Complex	25	66.94	10.46		
	European Gaza Hospital	25	67.17	9.72		
	Al-Aqsa Martyrs hospitals	25	65.94	8.53		
	Indonesian Hospital	20	67.48	6.63		
	Total	120	66.90	8.83		

[*]$P \leq 0.05$: Significant, $P > 0.05$: Not significant; **n**: number of the subjects; **SD:** standard deviation; & **t:** independent t-test

The mean difference of studied domains related to hospitals is pointed out in table 4.19. The one-way ANOVA test showed there is no statistically significant difference between

means of risk factors of LBP, work environment characteristics, knowledge regarding safety measures to avoid LBP during work and domains as total related to hospitals (P>0.05). The result is agreed with others studies (Almaghrabi & Alsharif, 2021) which showed that there is no association between low back pain and work location. That showed nurse working in intensive care units are handling LBP in most hospitals and there is no statistically significant difference between means of LBP during work and hospitals.

4.20 Mean difference of studied domains related to the work overtime hours

Table (4.20): Mean difference of studied domains related to the work overtime hours

Domains	Work overtime hours	N	Mean	SD	t	P-value
Characteristics of low back pain	Yes	39	45.40	12.65	-0.325	0.746
	No	43	46.42	15.62		
Risk factors of LBP	Yes	39	73.08	14.77	0.320	0.750
	No	43	72.05	14.40		
Work environment characteristics	Yes	53	53.92	16.20	0.530	0.597
	No	67	52.21	18.65		
Knowledge regarding safety measures to avoid LBP during work	Yes	53	89.81	12.73	0.886	0.377
	No	67	87.49	15.32		
Total	Yes	53	67.58	9.18	0.747	0.456
	No	67	66.37	8.58		

[*]P≤0.05: Significant, P>0.05: Not significant; **n**: number of the subjects; **SD:** standard deviation; & **t:** independent t-test.

Table 4.20 showed the mean difference of studied domains related to work overtime hours. The results showed that there is no statistically significant difference in the mean of work characteristics of low back pain, environment characteristics, knowledge regarding safety measures to avoid LBP during work, and domains as total between who have work overtime hours and those who haven't (P>0.05). The result is inconsistent with others studies (Kore et al., 2021; Pandey, 2021 and Skela-Savič et al., 2017) which showed that there is association between low back pain domains and overtime hours. The different in results may be due to different in sample size and sample.

4.21 Mean difference of studied domains related to the overtime hours per week

Table (4.21): Mean difference of studied domains related to the overtime hours per week

Domains	Overtime hours per week	N	Mean	SD	t	P-value
Characteristics of low back pain	Less than 10	22	46.58	12.76	0.659	0.514
	10 or more	17	43.87	12.71		
Risk factors of LBP	Less than 10	22	73.86	12.18	0.374	0.710
	10 or more	17	72.06	17.93		
Work environment characteristics	Less than 10	31	53.23	14.98	-0.370	0.713
	10 or more	22	54.91	18.09		
Knowledge regarding safety measures to avoid LBP during work	Less than 10	31	90.71	11.73	0.606	0.547
	10 or more	22	88.55	14.21		
Total	Less than 10	31	68.13	8.51	0.509	0.613
	10 or more	22	66.82	10.19		

*P≤0.05: Significant, P>0.05: Not significant; **n**: number of the subjects; **SD:** standard deviation; & **t:** independent t-test.

Table 4.21 showed the mean difference of studied domains related to the overtime hours per week. The results showed that there is no statistically significant difference in the mean of work characteristics of low back pain, environment characteristics, knowledge regarding safety measures to avoid LBP during work and domains as total between who have the overtime less than 10 hours per week and who have 10 hours or more (P>0.05). The result is inconsistent with others studies (Mekonnen et al., 2019; Pandey, 2021 and Skela-Savič et al., 2017) which showed that there is association between low back pain domains and overtime hours per week (P<0.05). The different in results may be due to different in sample size and sample.

4.22 Mean difference of studied domains related to their number of shifts are involved per week

The mean difference of studied domains related to the number of shifts are involved per week is pointed out in table 4.22. The one-way ANOVA test showed there is no statistically significant difference between means of risk factors of LBP, work environment characteristics, knowledge regarding safety measures to avoid LBP during work, and domains as total related to the number of shifts are involved per week (P>0.05). The current study consistent with others studies (Feldman et al., 2001 and Tamrin et al., 2007) which showed that there is no related between low back pain domains and number of shifts are involved per week (P<0.05).

The different in results may be due to different in sample size and sample while in consistent with others studies (Smith et al., 2009 and Pandey, 2021) there is related between low back pain domains and number of shifts are involved per week.

Table (4.22): Mean difference of studied domains related to their number of shifts are involved per week

Domains	number of shifts are involved per week	N	Mean	SD	F	P-value
Characteristics of low back pain	2	5	39.95	11.14	1.255	0.296
	3	4	34.88	10.65		
	4	7	45.89	16.31		
	5	66	47.06	14.23		
	Total	82	45.94	14.20		
Risk factors of LBP	2	5	78.40	9.48	0.622	0.603
	3	4	68.75	14.10		
	4	7	67.71	22.34		
	5	66	72.83	13.96		
	Total	82	72.54	14.50		
Work environment characteristics	2	7	56.00	14.08	1.987	0.120
	3	5	55.00	23.86		
	4	11	64.45	17.21		
	5	97	51.34	17.22		
	Total	120	52.97	17.56		
Knowledge regarding safety measures to avoid LBP during work	2	7	92.29	13.17	0.550	0.649
	3	5	94.60	8.05		
	4	11	89.36	11.95		
	5	97	87.84	14.79		
	Total	120	88.52	14.22		
Total	2	7	68.24	10.42	0.808	0.492
	3	5	64.73	8.55		
	4	11	70.46	8.74		
	5	97	66.52	8.77		
	Total	120	66.90	8.83		

[*]$P \leq 0.05$: Significant, $P > 0.05$: Not significant; **n**: number of the subjects; **SD:** standard deviation & **F**: one-way ANOVA.

4.23 Mean difference of studied domains related to the have another job after your formal work

Table (4.23): Mean difference of studied domains related to the have another job after your formal work

Domains	Have another job after your formal work	N	Mean	SD	t	P-value
Characteristics of low back pain	Yes	17	44.96	13.53	-0.318	0.751
	No	65	46.19	14.47		
Risk factors of LBP	Yes	17	77.41	11.36	1.571	0.120
	No	65	71.26	15.03		
Work environment characteristics	Yes	21	53.24	18.26	0.078	0.938
	No	99	52.91	17.50		
Knowledge regarding safety measures to avoid LBP during work	Yes	21	91.43	12.88	1.033	0.304
	No	99	87.90	14.48		
Total	Yes	21	67.84	9.80	0.531	0.596
	No	99	66.71	8.66		

*P≤0.05: Significant, P>0.05: Not significant; **n**: number of the subjects; **SD:** standard deviation; & **t:** independent t-test.

Table 4.23 showed the mean difference of studied domains related to have another job after your formal work. The results showed that there is no statistically significant difference in the mean of work characteristics of low back pain, environment characteristics, knowledge regarding safety measures to avoid LBP during work, and domains as total between who have another job after your formal work and those who haven't (P>0.05). The current result is consistent with others studies (Choobineh et al., 2021; Thakur & Dhumale, 2020) which showed that there is association between low back pain domains and overtime hours per week (P<0.05). The different in results may be due to different are and most of study sample have low back pain.

4.24 Mean difference of studied domains related to the complaint of low back pain

Table (4.24): Mean difference of studied domains related to the complaint of low back pain

Domains	Complain of Low Back Pain	N	Mean	SD	t	P-value
Work environment characteristics	Yes	82	51.60	18.52	-1.258	0.211
	No	38	55.92	15.09		
Knowledge regarding safety measures to avoid LBP during work	Yes	82	89.34	13.47	0.933	0.353
	No	38	86.74	15.76		
Total	Yes	82	64.85	7.79	-3.960	0.000
	No	38	71.33	9.42		

*P≤0.05: Significant, P>0.05: Not significant; **n**: number of the subjects; **SD:** standard deviation; & **t:** independent t-test.

Table 4.24 showed the mean difference of studied domains related to the complaint of low back pain. The results showed that there is a statistically significant lowering in the mean of domains as total between those who have complained of low back pain and those who haven't (P<0.05). The table showed that there is no statistically significant difference in the mean of work characteristics of low back pain, environment characteristics, knowledge regarding safety measures to avoid LBP during work, and domains as total between those who have complained of low back pain and who haven't (P>0.05). The findings of the current study showed that there is a statistically significant association between those who have complained of low back pain and those who haven't reading LBP as a total and the result is consistent with Another study conducted in Jordan revealed that among 384 nurses from 7 public hospitals and 1 university hospital, many nurses complained of LBP, with the current, last-year, and cumulative prevalence of LBP being 69.0%, 78.9%, and 83.6%, respectively (Suliman, 2018).

4.25 Correlation between studied domain

Table 4.25 showed the correlation between the total score of domains among the study sample. Pearson correlation showed that there is no significant correlation between characteristics of low back pain, risk factors of LBP, work environment characteristics and knowledge regarding safety measures to avoid LBP during work (P > 0.05). The findings of the current study showed that there is no association between studied domain and these results agree with another study by Goudarzi et al., (2021) that showed there is no significant correlation between characteristics of low back pain, risk factors of LBP, work environment characteristics regarding to knowledge safety measures to avoid LBP during work.

Table (4.25): Correlation between studied domain

Domains	Risk factors of LBP		Work environment characteristics		Knowledge regarding safety measures to avoid LBP during work	
	r	P-value	r	P-value	r	P-value
Characteristics of Low Back Pain	-0.037	0.895	-0.022	0.937	-0.170	0.545
Risk factors of LBP			0.002	0.993	-0.150	0.594
Work environment characteristics					0.008	0.972

Chapter 5
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5.1 Conclusion

- This study aimed to identify the low back pain among ICU nurses in government hospitals in Gaza. A analytical cross-sectional descriptive design was conducted for intensive care unit nurses working in government hospitals in Gaza. The target population of this study consisted of 120 participants. The response rate to the questionnaire was 90%. And the results showed LBP prevalence was 68.3 at the time of job acquisition. LBP was 58.3% among male intensive care unit nurses and 41.7% among female intensive care unit nurses.

- The highest percentage (43.3%), among those having age group between (26 – 30 years) were complaining of LBP, 31.7% age group (less than 30 years), 25.0% age group (25 years or less).

- The majority of the study population were married (65.8%) while 31.7% of them were single and 2.5% divorced.

- The distributions of the study population according to BMI showed that more than half of participants were normal weight (55.8%) while 31.7% were overweight and 12.5% obese.

- Among those who complain of LBP, 37.8% described pain as a stiffness nature, 18.3% described it as a numbness, 18.3% reported a non clear pain, 13.4% tingling, 12.2 burning. The study revealed that there are statistically significant differences among places of work regarding LBP distribution. But it revealed that there are no significant differences between (gender, age, marital status, and years of experience) and LBP.

- The study revealed that there are statistically significant differences between place of work and years of experience regarding severity of pain.

- Regarding BMI and LBP, the study revealed that 55.8% of participants with a BMI (normal weight) complained of LBP, but there were no significant differences between them. Ninety-seven participants reported that prolonged standing was the dominant risk factor in the workplace, followed by Bending and twisting, Lifting heavy objects and Work overload, Lifting and transferring

patients, and 12.2% of participants reported that Sustained trauma during work was the least. A risk factor followed by Wearing high heel shoes during work and Unsuitable posture during work.

- The majority of the participants reported that the necessary equipment's such as wheels, mechanical devices for patient lifting, rails, ramps to minimize awkward movements are not present. Also they reported that the floor is sloppy and there are no adequate staff in intensive care unit, so it is clear that intensive care unit in Gaza hospitals need some modification to suit the health of the ICU nurses such as availability of mechanical lifting devices for patient lifting, repair of floors, availability of wheels to move heavy equipment's, presence of good ventilation, removing unnecessary furniture and minimizing the crowding in the work place. The study showed that the majority of the participants has enough and good knowledge regarding safety measures to avoid LBP during work and there is a gap between knowledge and practice.

- Regarding suggested ranking: participants ranked providing adequate staff in ICU as a first priority, followed by taking rest breaks during work, reduce number of shifts, reduce working hours. They reported practicing some exercises during work as the least priority followed by stopping working when pain starts and changing work position frequently.

5.2 Recommendations

- Providing intensive care unit with equipment's and devices necessary to facilitate lifting patients and heavy machines, comfortable chairs, rails, ramps to minimize inappropriate movements and minimizing the level of noise in the work place.

- Supplying the intensive care unit with adequate staff to sort the effort on more than one, and supplying it with workers for taking upon themselves the responsibilities that are not part of the nursing staff work.

- Occasionally and regular assessment by ministry of health of intensive care unit and the factors causing low back pain especially causes of LBP due to different work places.

- Conducting a site visit for the Comfortable assessment. This evaluation can identify many direct and indirect factors that may contribute to injury risks, and also identify potential solutions that will serve to minimize such risks.
- Organizing a health education program to focus on back health and prevent injuries.
- Supporting the scope of environmental and occupational health and encouragement of further researches and studies in regard to workers health.

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Appendices

Appendices

Annex (1): Map of Palestine
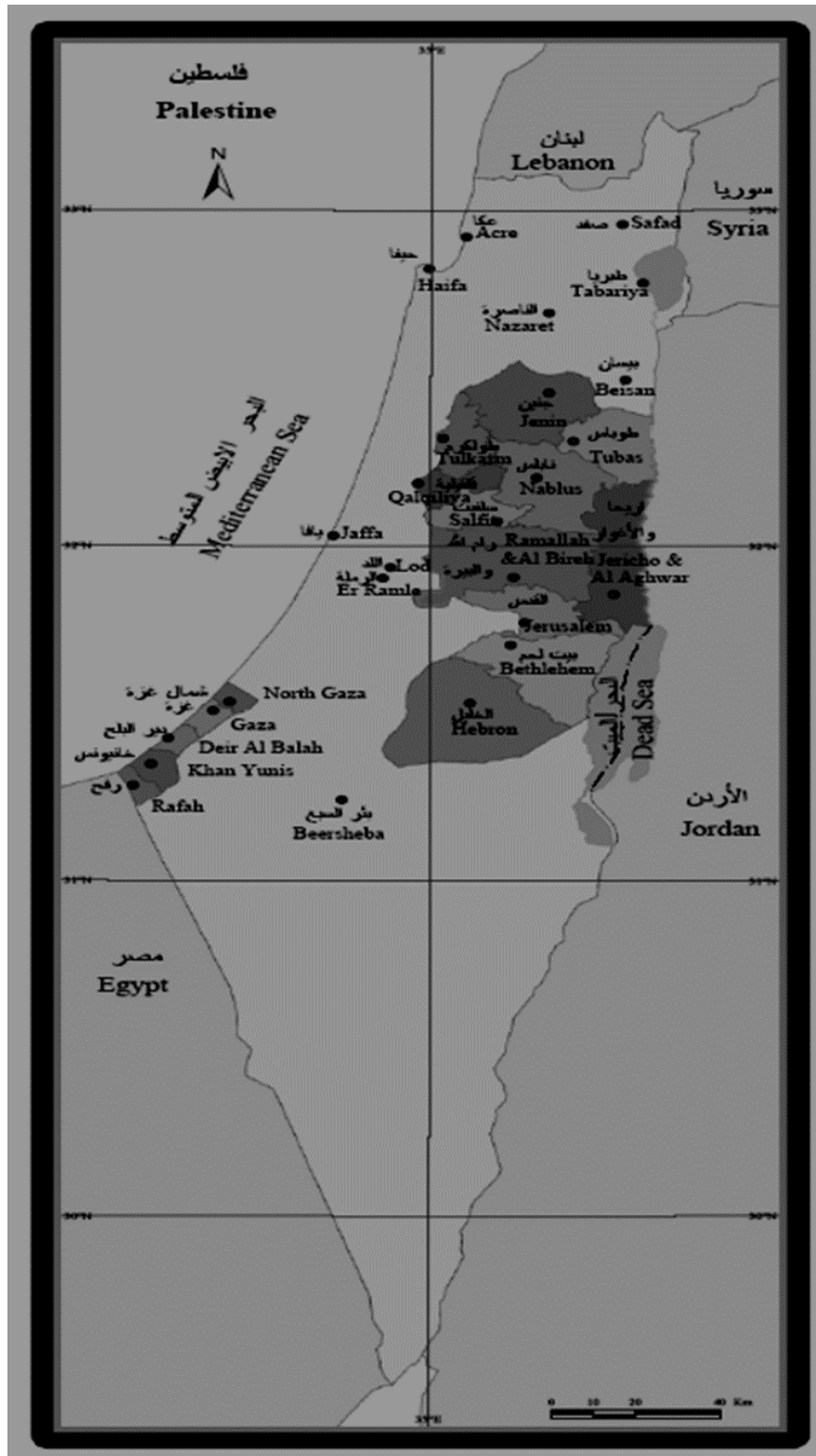
Annex (2): Intensive care unit bed capacity and nurses till 2021

Hospital	NO. of nurses	NO. of bad
Al-Shifa Medical complex	25	9
Nasser Medical Complex	25	8
European Gaza Hospital	25	12
Al-Aqsa Martyrs hospitals	25	6
Indonesian Hospital	20	7
Total	**120**	**42**

(Nursing Unit, 2021)

Annex (3): Request for approval from Helsinki Committee

المجلس الفلسطيني للبحث الصحي
Palestinian Health Research Council

تعزيز النظام الصحي الفلسطيني من خلال مأسسة استخدام المعلومات البحثية في صنع القرار

Developing the Palestinian health system through institutionalizing the use of information in decision making

Helsinki Committee
For Ethical Approval

Date: 2021/06/07   Number: PHRC/HC/902/21

Name: Haneen Mahdy Abu bakra   الاسم:

We would like to inform you that the committee had discussed the proposal of your study about:

نفيدكم علماً بأن اللجنة قد ناقشت مقترح دراستكم حول:

Low Back Pain Among Intensive Care Unit Nurses at Governmental Hospitals in Gaza Strip

The committee has decided to approve the above mentioned research. Approval number PHRC/HC/902/21 in its meeting on 2021/06/07

و قد قررت الموافقة على البحث المذكور عاليه بالرقم والتاريخ المذكوران عاليه

Signature

Dr. Ychia Abed

Member   Member

Chairman

Genral Conditions:-
1. Valid for 2 years from the date of approval.
2. It is necessary to notify the committee of any change in the approved study protocol.
3. The committee appreciates receiving a copy of your final research when completed.

Specific Conditions:-

Annex(4): Request for approval from MOH

التاريخ:13/06/2021

رقم المراسلة 706695

السيد : رامي عيد العبادله   المحترم

مدير عام بالوزارة /الإدارة العامة لتنمية القوى البشرية/وزارة الصحة

السلام عليكم ،،،

<u>الموضوع/ تسهيل مهمة الباحثة// حنين أبو بكرة</u>

التفاصيل //

بخصوص الموضوع أعلاه، يرجى تسهيل مهمة الباحثة/ **حنين مهدي أبو بكرة**
الملتحقة ببرنامج ماجستير الرعاية الحثيثة – الجامعة الاسلامية بغزة في إجراء بحث بعنوان:–
Low Back Pain Among Intensive Care Unit Nurses at Governmental Hospitals in Gaza
"Strip"

حيث الباحثة بحاجة لتعبئة استبانة من عدد من الممرضين العاملين في اقسام العناية المركزة في المستشفيات الحكومية
، بما لا يتعارض مع مصلحة العمل وضمن أخلاقيات البحث العلمي، ودون تحمل الوزارة أي أعباء أو مسئولية.
وتفضلوا بقبول التحية والتقدير،،،

ملاحظة /
البحث المذكور حاصل على موافقة لجنة اخلاقيات البحث الصحي (لجنة هلسنكي)
تسهيل المهمة الخاص بالدراسة أعلاه صالح لمدة 3 اشهر من تاريخه.

محمد ابراهيم السرساوي
مدير دائرة/الإدارة العامة لتنمية القوى البشرية

Annex(5): Questionnaire (English version)

<div dir="rtl">

بسم الله الرحمن الرحيم

الرقم المسلسل : ....

زميلي/زميلتي العزيز/ة   حفظك/ي الله

السلام عليكم ورحمة الله وبركاته

تقوم الباحثة بإعداد رسالة ماجستير بعنوان

</div>

Low Back Pain Among Intensive Care Unit Nurses at Governmental Hospitals in Gaza Strip

<div dir="rtl">

آلام أسفل الظهر لدى ممرضي وحدة العناية المركزة بالمستشفيات الحكومية في قطاع غزة

إن هذا البحث يشكل جزء ضروري من دراستي للحصول على درجة الماجستير في العناية الحثيثة – كلية التمريض بالجامعة الاسلامية.

وقد تم اختياركم ضمن مجموعة العاملين في قسم العناية المركزة للإجابة على العبارات الواردة فيها.

إذا كنت توافق على المشاركة في هذه الدراسة، **يرجى التكرم بقراءة العبارات التالية بدّقة والإجابة عنها بموضوعية لما في ذلك من أثرٍ كبير على صحة النتائج والنصائح** التي سوف يتوصل إليها الباحث. مع التأكيد بأن هذه البيانات سوف تستخدم لأغراض البحث العلمي فقط، وسيتم التعامل معها بسرية تامة.

أوافق ☐   ☐ لا أوافق

الباحثة/

حنين مهدي أبو بكره

<u>haneen.mahdy1991@gmail.com</u>

</div>

Questionnaire for Low Back Pain Among Intensive Care Unit Nurses at Governmental Hospitals in Gaza Strip

<u>Part A</u>: **Socio-Demographic data:**

- Gender ☐ Male ☐ Female
- Age in years ……………………….
- Height ……………… cm.
- Weight ……………… kg.
- BMI ………………...
- Marital status ☐ Single ☐ Married ☐ Divorced ☐ Widow
- If you are female: Pregnant ☐ Yes ☐ No
- Education: ☐ Diploma(2 years) ☐ Diploma(3 years) ☐ Bachelor ☐ Post graduate
- Years of experience in intensive care unit ....
- Smoking? ☐ Yes ☐ No
- Do you work overtime hours in this hospital? ☐ Yes ☐ No
- If yes, how many hours per week ……………
- Do you have another job after your formal work? ☐ Yes ☐ No
- If yes, describe ………………>>…………………………….
- Number of shift you involved with per week …………………
- **Place of work** ☐ Al Shifa Medical complex ☐ Nasser Medical Complex ☐ European Gaza Hospital ☐ Al-Aqsa Martyrs hospitals ☐ Indonesian Hospital

Do you complain of Low Back Pain (LBP)? ☐ **Yes** ☐ **No**

- ➢ **If the answer is Yes, how long ………… years.**
- ➢ **If the answer is Yes, please go to <u>part (B)</u> and continue.**
- ➢ **If the answer is No, please skip to <u>part (E)</u> and continue.**

Have you seek Rx for the pain ? ☐ yes   ☐   No

> ➢ **If Yes, What types and treatment?**

☐ Medication ☐ Physiotherapy ☐ Alternative Medicine

Part B: characteristics of Low Back Pain (LBP):

No	Statement	Seldom	Quite often	Very often	Always
1.	Complaining of pain in the back				
2.	I got sick leave due to LBP				
3.	Complaining of alteration in sensation in lower extremities (paresthesia)				
4.	Complaining of alteration in gait				
5.	Low Back Pain starts during working hours				
6.	Complaining of alteration in spinal mobility				
7.	Onset of LBP is sudden				

Part C:8. Pain Severity:

The severity of pain is described as			
Mild	Moderate	Severe	Very severe

9.Pain Radiation

Complaining of pain radiating/radiated down to			
Rt. Leg	Lt. Leg	Both legs	Not radiate

10. Pain Nature

The pain is/was described as: (you can choose more than one)				
Numbness	Burning	Tingling	Stiffness	Not clear

11. Pain Duration:

The duration of pain is/was described as:				
Continuous	Intermittent	Hours	Weeks	Months or more

12. Pain frequency

Frequency of pain described as:				
All the time	Once a week	Once a month	More than once a month	After shifts

13. Interventions performed to overcome low back pain

interventions performed to overcome low back pain				
Nothing	Exercise	Massage	Resting	Medication

Part D: Risk factors of LBP: (In your case, which of the following factors causes your pain?) *please mark the ones suits you.*

No	Risk factor / cause	Yes	No
14	Sustained trauma during work		
15	Uncomfortable chairs		
16	Prolonged time standing		
17	Sudden movements		
18	Bending and twisting		
19	Lifting heavy objects		
20	Work overload		
21	Wearing high heel shoes during work		
22	Unsuitable posture during work		
23	Working environment (light, ventilation, heat, noise and crowed)		
24	Lifting and transferring patients		
25	Positioning a patient		
26	Holding an extremity during any procedure		

Part E: Work environment characteristics:

No	Statement	Yes	No
27	Is there enough lighting in your work place?		
28	Is there good ventilation in your work place?		
29	Is there good air conditioning to maintain proper intensive care unit temperature in your work place?		
30	Are the chairs comfortable chairs ?		
31	Is the floor sloppy ?		
32	Is there much furniture that restricts your free movement?		
33	Are there wheels and other heavy devices to move heavy equipment?		
34	Are high monitoring devices, machines, and tool kits comfortable for you?		
35	Is your work place crowded?		
36	Are there mechanical devices for patient lifting?		
37	Are there Adequate staffing?		
38	Are there rails ramps to minimize awkward movements?		
39	Is your work place noisy?		

Part F: Knowledge regarding safety measures to avoid LBP during work:

No	Statement	Yes	No
40	Sitting properly on chair will reduce pain		
41	Handling instruments / ~~equipment~~ properly will reduce pain		
42	Sitting in one place for long time may increase your pain		
43	Bending for long time may increase your pain		
44	Stretching your body intermittently may decrease your pain		
45	Sudden movements may increase your pain		
46	Wearing high heel shoes during work may increase your pain		
47	Fluctuating room temperature may increase your pain		
48	Noise and crowed at work place may increase your pain		
49	Presence of wheels and other heavy devices to move heavy equipment and patients will reduce LBP		
50	Ergonomic design of ICU will decrease the pain such as rails or ramps.		

Part G: Suggestions / recommendations to reduce pain (rank the following suggestions according to priority from No. 1 to 10)

Suggestion / recommendation	Rank
Reduce working hours	
Reduce number of shifts per week	
Practice some exercises during work	
Wear comfortable shoes / clothes during work	
Avoid sudden movements	
Change work position frequently	
Stop working when pain starts	
Provide adequate staffing in ICU	
Providing comfortable and suitable chairs for ICU nurses	
Using lifting assistance devices to help lift and move patients, also to help lift heavy equipment	

Researcher

Haneen Mahdi Abu Bakra

- الحالة الاجتماعية ☐ أعزب /عزباء ☐ متزوج/ة ☐ مطلق/ة ☐ أرمل/ة
- الطول .... سم
- الوزن .... كجم
- المؤهل العلمي ☐ دبلوم سنتين ☐ دبلوم (3) سنوات ☐ بكالوريوس ☐ دراسات عليا
- مكان العمل ....
- عدد سنوات الخبرة في قسم العناية ....
- هل تعمل ساعات إضافية بالمستشفى ☐ نعم ☐ لا
- إذا كانت الإجابة "نعم" ، كم ساعة إضافية تعمل أسبوعياً ....
- هل تعمل في وظيفة إضافية خارج نطاق العمل الرسمي بالمستشفى ☐ نعم ☐ لا
- إذا كانت الإجابة "نعم" ، أوصف العمل الإضافي ....
- عدد ايام العمل اسبوعيا ....

➢ **هل تعاني/ين من آلام أسفل الظهر ☐ نعم ☐ لا**

إذا كانت الإجابة " بنعم'' انتقل/ي للجزء الثاني مباشرة وأكمل/ي تعبئة الاستبانة

➢ **إذا كانت الإجابة " لا'' ، انتقل/ي للجزء الخامس وأكمل/ي تعبئة الاستبانة**

الجزء الثاني:

1. خصائص آلام أسفل الظهر

م.	العبارة	نادراً	غالباً	في كثير من الأحيان	دائماً
1.	أشكو من آلام في الظهر				
2.	هل حصلت على إجازة مرضية نتيجة ألام في أسفل الظهر				
3.	أشكو من تغير في الإحساس بالأطراف السفلية (أشعر بالوخز)				
4.	أشكو من تغير في المشية				
5.	يبدأ الألم خلال ساعات العمل الرسمي				
6.	أشكو من تغير في حركة العمود الفقري				
7.	يبدأ ألم الظهر فجأة				

8. وصف شدة الألم

كيف توصف/ين شدة الألم			
خفيفة	متوسطة	حادة	حادة جداً

10.امتداد الألم :

	يمتد الألم إلى		
لا يمتد	الساقين	الساق الأيسر	الساق الأيمن

<u>الجزء الثالث :</u>

11.بيانات عن طبيعة الألم (خصائص أو مواصفات)

حدد/ي مواصفات الألم الذي تعاني/ين منها الآن أو التي عانيت/ي منها (تستطيع أن تختار أكثر من إجابة)				
غير واضح	تصلب	وخز	حرقان	خذلان

12. بيانات عن مدة الألم

حدد/ي مدة الألم الذي تعاني/ين منه الآن أو عانيت/ي منه				
شهر أو أكثر	أسابيع	ساعات	متقطع	مستمر(دائم)

<u>الجزء الرابع:</u>

العوامل المسببة لآلام أسفل الظهر

اختر/اختاري العوامل التي ترى/ن أنها قد سببت لك/ي آلام أسفل الظهر في العمل (من الممكن أن تختار/ي أكثر من إجابة)

لا	نعم	العامل / العوامل المسببة	م.
		تعرضت لإصابة ثابتة أثناء العمل	13
		استخدام كراسي غير مريحة	14
		الوقوف لفترات طويلة	15
		الحركات المفاجئة أثناء العمل	16
		الانحناء والالتفاف	17
		حمل الأشياء الثقيلة	18
		ضغط العمل الشديد	19
		ارتداء أحذية عالية الكعب أثناء العمل	20
		أكون في وضعية غير مناسبة أثناء العمل	21
		بيئة العمل مثل (الإضاءة' التهوية' الحرارة' الضوضاء والازدحام أثناء العمل)	22
		حمل ونقل المرضى خلال العمل	23
		حمل أطراف وأجزاء من المريض يدوياً في أي إجراء	24

خصائص بيئة العمل

لا	نعم	العبارة	م.
		هل يوجد إضاءة كافية في العمل؟	26
		هل يوجد تهوية جيدة في العمل؟	27
		هل يوجد تكييف هواء جيد للحفاظ على درجة الحرارة أثناء العمل؟	28
		هل الكراسي المستخدمة للجلوس أثناء العمل مريحة ؟	29
		هل أرضية القسم جيدة ؟	30
		هل يوجد هناك أثاث كثير في العناية المركزة يحد من حركتك أثناء العمل ؟	31
		هل يوجد عجلات أو ناقلات لحمل الأجهزة والمعدات والأدوات الثقيلة خلال العمل ؟	32
		هل أجهزة وآلات وأدوات المراقبة العالية مريحة لك؟	33
		هل يوجد ازدحام خلال العمل؟	34
		هل هناك أجهزة ميكانيكية لرفع المريض؟	35
		هل يوجد عدد كافٍ من التمريض العاملين بالقسم؟	36
		هل هناك سلالم لتقليل من الحركة الصعبة أثناء العمل ؟	37
		هل يوجد ضوضاء خلال العمل ؟	38

الجزء السادس :

درجة معرفة ووعي التمريض العاملين بأقسام عمليات مستشفيات القطاع الحكومية فيما يتعلق بتدابير السلامة والأمان لتجنب حدوث آلام أسفل الظهر

لا	نعم	العبارة	م.
		الجلوس بوضعية مناسبة أثناء العمل يقلل من حدوث الألم	40
		حمل الأدوات الجراحية والأجهزة بشكل مناسب يقلل من حدوث الألم	41
		الجلوس في مكان واحد لفترة طويلة من الممكن أن يزيد حدوث الألم	42
		الانحناء لفترة طويلة من الوقت يزيد من حدوث الألم	43
		تمدد جسمك بشكل متقطع أثناء العمل يقلل من الألم	44
		الحركات المفاجئة أثناء العمل تزيد من حدوث الألم	45
		ارتداء أحذية عالية الكعب خلال العمل يزيد من حدوث الألم	46
		تقلب درجة حرارة الغرفة من الممكن أن يزيد حدوث الألم	47
		الضوضاء والازدحام خلال العمل من الممكن أن تزيد الألم	48
		توفر العجلات أو الناقلات لحمل الأجهزة والأدوات الثقيلة وحمل المرضى يقلل من حدوث الألم	49
		تصميم قسم العناية المركزة بشكل صحي مهني يتناسب مع مبادئ الصحة المهنية	

الاقتراحات والتوصيات التي يجب أخذها بعين الاعتبار لتقليل حدوث آلام أسفل الظهر

من فضلك رتب/ي المقترحات أو التوصيات التالية التي تراها/ترينها مناسبة لتقليل حدوث آلام

أسفل الظهر حسب الأولوية من 1 إلى 10

الترتيب	المقترحات / التوصيات	
	تقليص عدد ساعات العمل اليومية	1
	تقليل عدد الدوامات أسبوعياً	2
	ممارسة بعض التمارين الرياضية أثناء الدوام	3
	ارتداء حذاء وملابس مريحة أثناء العمل	4
	تجنب الحركات المفاجئة	5
	تغيير وضعية جسمك أثناء العمل من وقت لآخر	6
	التوقف عن العمل عند حدوث الألم	7
	تزويد قسم العناية المركزة بطاقم تمريضي كافٍ	8
	تزويد قسم العناية المركزة بالكراسي المريحة للظهر	9
	توفر واستخدام آلات حمل مساعدة لحمل ونقل المرضى وكذلك حمل الأجهزة والأدوات الثقيلة أثناء العمل	10

مع خالص تمنياتي للجميع بالتوفيق من الله لما فيه الخير

الباحثة/

حنين مهدي أبو بكره

Annex (7): Experts panel

Experts Panel

1. Dr. Yousif Jeesh   Islamic University
2. Dr. Akram Abu Salah   Palestine College of Nursing
3. Dr. Yousef Fahjan   Nursing Unit - MOH
4. Dr. Ayman Abu Mustafa   Palestine College of Nursing
5. Dr. Sharaf shrafy   Al-Aqsa University
6. Dr. Hamoda Abu Oda   Nursing Unit - MOH
7. Dr. Abd Majeed Thabet   Palestine College of Nursing
8. Dr. Mohammed krazem   Islamic University
9. Dr. Abed Alrahman Al Hams Palestine College of Nursing
10. Dr. Ashraf Eljedi   Islamic University