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A Study to Assess the Effectiveness of Body Mechanics Training Programme on Reducing Low Back Pain Among Nursing Officers Working in Selected Hospitals, Bangalore

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Abstract

Background: *Low Back Pain (LBP) is a common work related injury and costly problem among the nursing profession. Numerous studies indicate a greater occurrence of back pain and work-related back injuries among nursing officers in comparison to other occupations. Prevention of LBP is a very important technique to maintain proper body mechanics. This study aimed to assess the effectiveness of body mechanics training programme on reducing low back pain among nursing officers working in KIMS Hospital & Research Centre, Bangalore.* ***Objectives:*** *1. The objectives of this study were: 1. To assess the prevalence of low back pain (LBP) among nursing officers. 2. To evaluate the efficacy of a body mechanics training program in decreasing LBP among nursing officers. 3. To determine the correlation between LBP scores of nursing officers and specific biophysical factors. The research methodology employed a quasi-experimental design utilizing a single-group pre-test and post-test time series approach, with the selection of participants done through non-probability purposive sampling. Data was gathered from 40 nursing officers utilizing the Defence and Veterans Pain Rating Scale (DVPRS). After the demonstration of body mechanics, training program was implemented and post-test was conducted on 7th, 14th, and 21st days by using same tool to compare difference between observations.* ***Results:*** *The overall pretest showed that majority (55%) of nursing officers had moderate LBP, followed by 37.5% of severe LBP and 7.5% of nursing officers had mild LBP and in the post-test, it was observed that the level of LBP slowly reduced during observation-I, observation-II, and observation-III respectively, and enhancement in the mean difference in LBP among nursing officers were highly significant with p-value <0.0001. There was a significant association between LBP and biophysical variables, such as the number of patients lifted per day, with a chi-square value of 11.64 and a p-value of 0.02. Interpretation and Conclusion: In this study, it was revealed that a body mechanics training programme was effective in reducing LBP.*

Keywords: LBP, body mechanics training programme, KIMS hospital, nursing officers, DVPRs

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INTRODUCTION

"The true sign of intelligence is not knowledge but imagination".

—Albert Einstein

Low back pain (LBP) stands as one of the most prevalent forms of work-related musculoskeletal disorders (MSDs). It refers to discomfort experienced in the lumbar and buttock areas caused by irritation or injury to neurons near or around the spinal canal due to pathological processes. LBP represents a significant public health concern due to

its widespread occurrence and its substantial adverse effects on physical, psychological, social, and economic well-being. Usually, this ailment is classified according to the duration of pain into three categories: acute (lasting under 6 weeks), sub-acute (lasting between 6 and 12 weeks), and chronic (lasting over 12 weeks) [1].

Nurses frequently engage in demanding tasks in an upright position for extended periods, such as assisting in surgeries, performing CPR and emergency procedures, repositioning patients, manoeuvring medical equipment, and transferring patients, both conscious and unconscious. Proper application of body mechanics principles is crucial in these nursing duties to prevent musculoskeletal disorders such as low back pain (LBP). Researchers emphasize the importance of educating undergraduate nursing students on the use of body mechanics principles during nursing activities and implementing systematic training programs or in-service training sessions for nursing staff in their workplace [2].

Body mechanics encompasses the coordinated function of the musculoskeletal and nervous systems, ensuring proper body alignment, balance, and posture, essential for optimal bodily function in everyday activities. Poor or incorrect posture during work increases the risk of injury or physical harm. Body mechanics refers to the technique of effectively utilizing the body during various movements, including reaching, standing, sitting, lying down, bending, lifting heavy objects or individuals, and carrying out tasks [2]. The objective of this study was to investigate the frequency of low back pain (LBP) and its clinical attributes among operating room staff at Shiraz University of Medical Sciences. The results of this investigation will be shared with hospital administrators and operating room supervisors, enabling them to develop appropriate strategies for preventing, managing, and minimizing the recurrence of LBP among operating room staff [3].

Low back pain (LBP) not only impacts the health of nurses but also influences the quality of care they deliver. It stands as the most prevalent musculoskeletal disorder, affecting approximately 28–47.7% of dental personnel and 50–85% of the general adult population during their lifetime. According to data from US burden of disease collaborators, LBP ranks 3rd among all diseases and injuries contributing to disability-adjusted life years, and it represents a significant cause of activity limitation among individuals under 45 years old. Additionally, it ranks 5th in terms of hospital admissions and 3rd in terms of surgical procedures [4].

Nursing involves extensive heavy lifting during patient repositioning and movement. Studies have identified nursing as the occupation with the highest incidence of heavy lifting. Among nurses, heavy lifting represents a major risk factor for developing musculoskeletal injuries, particularly in the lower back. Research indicates that nurses engaged in manual patient repositioning, transfer, or lifting face a higher risk of experiencing LBP compared to those who do not perform these tasks. Prolonged work hours and overtime increase exposure to physical strain, consequently raising the likelihood of musculoskeletal issues. Additionally, elevated psychosocial demands, coupled with inadequate social support and limited job control, also contribute to the occurrence of LBP [5].

Nursing plays a crucial role in healthcare delivery, requiring nurses to engage multiple muscle groups during activities involving lifting and forceful movements, affecting body mechanics. Inefficient utilization of these forces significantly reduces nurses' effectiveness. It often comes as a surprise to many that nursing ranks as the most hazardous profession for back injuries and musculoskeletal disorders compared to any other occupation. It is widely recognized that LBP is a serious problem in the nursing profession [6]. Nursing in the past was identified as an occupation whose practitioners were at risk of developing LBP. The one-year prevalence of LBP in nurses has been reported to be between 45 and 74%. In one study, the lifetime prevalence of LBP was 82.03%, and the point prevalence of LBP among 247 nurses was 43.78%. Another study involving 3,169 health care workers, including non-specialized nurses, intensive care nurses, surgical nurses, and X-ray technologists, showed the prevalence rate for LBP to be 76% [7].

"Body mechanics refers to the everyday movements individuals perform, such as lying down, sitting, standing, lifting, pulling, pushing, and walking. Proper body mechanics aid in alleviating and preventing future back issues, while poor body mechanics can lead to back problems and other musculoskeletal issues [7].

Body mechanics can impact back pain directly and vary between beneficial and detrimental. Healthcare professionals often engage in patient care tasks involving pushing, pulling, carrying, and lifting, which can lead to both patient and nurse injuries over time if performed incorrectly. Sufficient comprehension and implementation of correct body mechanics are crucial for reducing these hazards. Neglecting to use proper techniques during physical tasks can result in significant musculoskeletal strains and fatigue, elevating the likelihood of injury. Nurses should possess comprehensive scientific knowledge of body mechanics and employ it effectively in their daily routines to prevent strain, injury, and fatigue in muscles that may not provide optimal support and strength. Training plays a crucial role in reducing injury rates, evidenced by the higher occurrence of injuries among nursing aides, orderlies, and attendants compared to nursing officers. Effective training programs have been demonstrated through research findings [7].

Patient transfers encompass repositioning patients in bed and moving them from bed or chair to the toilet. These actions have consistently been associated with low back injuries among nurses and are considered the most taxing tasks in their line of work. Various measures have been taken to prevent low back injuries resulting from patient handling, including training in proper lifting methods, ergonomic adjustments, the use of mechanical aids, and personalized physical training programs.

Nurses may be encouraged to engage in routine exercises aimed at strengthening their back muscles, while employers can implement ergonomic modifications to minimize the risk of low back pain (LBP) associated with tasks like manual handling, uncomfortable body positions, and maintaining repetitive work postures [7].

Low back pain (LBP) continues to be a prevalent and financially burdensome issue within the nursing field. Numerous studies indicate a heightened occurrence of back pain and work-related back injuries among nurses compared to other professional cohorts. In Egypt, approximately 60% of the populace experiences back pain, with nurses documented to have one of the highest incidences of work-related back injuries among all occupational categories [7].

NEED FOR THE STUDY

"*For all the happiness mankind can gain: is not in pleasure, but in the rest from pain".*

—John Dryden

Significant risk factors for low back pain (LBP) include incorrect body mechanics or posture during physically demanding tasks, obesity, sedentary lifestyles, and aging. Approximately 37% of LBP cases globally are linked to occupations involving prolonged standing, such as mining, healthcare, and driving. LBP is strongly correlated with repetitive and prolonged bending or maintaining improper body posture. Healthcare professionals, notably nurses, often encounter musculoskeletal disorders like LBP at a higher frequency compared to workers in other physically demanding professions. This heightened risk is primarily attributable to the improper body mechanics employed during patient lifting, shifting, transferring, and repositioning tasks [8].

Low back pain (LBP) is a prevalent global concern, and its influence continues to increase. For instance, its prevalence has surged from 377.5 million to 577 million between 1990 and 2017. LBP is prevalent in all nations and across various age demographics. In 2015, research indicated that the worldwide prevalence of LBP, causing activity limitations, was 7.3%, impacting around 540 million people at some stage of their lives [9].

Although low back pain (LBP) is a concern in the general populace, it poses an even greater challenge for healthcare professionals, particularly nurses. Nursing emerges as a profession with the highest susceptibility to LBP, surpassing even heavy industry occupations in prevalence rates. Furthermore, nurses encounter a greater lifetime occurrence of LBP in contrast to the general populace, with certain research indicating rates reaching 90%. Moreover, recurrence rates of LBP among nurses surpass 70%. The repercussions of LBP on nurses are adverse, affecting their physical health, job contentment, and overall life satisfaction. Other negative consequences include heightened risk of chronicity, accompanying personal and financial burdens, decreased workforce productivity, increased absenteeism, and burnout. This heightened risk of LBP and its associated adverse effects often prompt many nurses to contemplate leaving their profession. A survey conducted in 2001, involving responses from over 40,000 nurses across five countries, revealed that 39% expressed intentions to depart from their occupation within a year due to the physical strains inherent in the job [9].

The occurrence of low back pain (LBP) in the general populace is estimated to range from 15 to 45%. A significant portion of LBP, approximately 37%, is associated with professions involving prolonged periods of standing, such as healthcare workers. LBP can originate from various structures in the spine, abdomen, or pelvic region. Among healthcare professionals, nurses exhibit a heightened incidence of LBP, attributed to both physical and emotional factors. Considering factors like extended periods of standing, unfavourable physical conditions, and restricted movement during surgical procedures, the prevalence of LBP was found to be 70.6% among operating room staff, as well as in many other areas of the hospital [10].

Several studies conducted across Europe, America, and Africa have explored low back pain (LBP) among nurses. In Sweden, research revealed that nearly 47% of assistant nursing staff experienced LBP. Similarly, in the United Kingdom, LBP affected 43.1% of all nursing personnel within a year. Additionally, a study in Tanzania found a significant prevalence of LBP among nurses, reaching 74%. In Nigeria, researchers reported a high occurrence of LBP, affecting 69% of nurses in a rural hospital setting [10].

In various Asian countries and around the world, the prevalence of low back pain (LBP) among nurses varies significantly across different countries and settings. For example, in Switzerland, it ranged from 73 to 76%, while in the Netherlands it was 62%. Italy reported a range of 33 to 86%, Turkey had a prevalence of 65.8%, and South Korea reported 90.3%. In Nepal, it was 78%, in Malaysia 63.1%, and in Qatar 54.3%. Saudi Arabia showed a range from 48.4 to 74.2%, Yemen had a prevalence of 74.5%, and Nigeria reported between 73.5 and 77.19%. Additionally, Egypt had a prevalence of 79.3%, Rwanda reported 78%, Tunisia showed 57.7%, and Ethiopia had a range from 45.8 to 60% [11].

The occurrence of low back pain (LBP) is notably elevated among healthcare professionals. In both European nations and the United States, LBP stands out as one of the most prevalent and financially burdensome health issues affecting healthcare personnel. Additional research indicates that among healthcare workers aged 30 to 49 years, the lifetime prevalence of LBP is 66.6%. Furthermore, LBP is linked to psychosocial factors such as stress, insufficient sleep, and daytime fatigue. Among various categories of healthcare providers, nurses consistently demonstrate the highest incidence of LBP. Every year, thousands of nurses around the world face lower productivity, receiving medical services [12].

A research conducted in Egypt aimed to assess the prevalence of low back pain (LBP) and explore the correlation between nurses' adherence to proper body mechanics and their exposure to workplace risk factors for LBP. The findings indicated that 88% of participants experienced lumbar region pain, and the majority of nurses did not employ proper body mechanics techniques when performing tasks such as moving, turning, lifting, and transferring patients. LBP was primarily associated with various risk factors, including obesity and insufficient knowledge and practice regarding correct body mechanics. Implementing educational initiatives focused on teaching appropriate body mechanics during patient handling and lifting is crucial in reducing LBP among nurses [13].

In today's world, musculoskeletal disorders pose a significant health concern linked to the workplace environment. Increased work intensity and growing demands on employees impose additional pressure and stress. Low back pain (LBP) is a prevalent work-related injury across all professions, often resulting from improper postures, lifting techniques, heavy loads, and repetitive tasks. Nursing, in particular, faces a heightened risk of developing back pain and associated complications. The frequency of LBP differs across various nations. Competent body mechanics entail employing suitable and skilful techniques for lifting and transporting patients or heavy items. Many nursing procedures require coordinated muscle usage, underscoring the importance of nurses possessing thorough knowledge of sound body mechanics for optimal effectiveness [13].

Chronic low back pain (LBP) refers to enduring pain lasting beyond 12 weeks and can stem from various sources. Between 1992 and 2006, the occurrence of chronic LBP almost doubled, rising from 3.9 to 10.2% over a 14-year period. Additionally, chronic LBP was more commonly observed in females than in males. Work conditions are a significant cause of LBP among nurses. LBP among nurses can be due to lifting weights beyond the individual's capacity, inadequate staff, incorrect use of body mechanics, and lack of training. Many patient-handling tasks are considered high risk for nurses. Manual handling, bending-twisting, hard physical labour, excessive stress, and nursing shortages are additional causes of LBP [14]. Individuals experiencing LBP may have various social, financial, and emotional problems. The high prevalence of LBP contributes to high healthcare costs and the shortage of nursing personnel. Both employers and employees can experience the effects of these issues. Nurses' high risk for LBP requires better prevention strategies. The CDC has emphasized studies to decrease the prevalence, incidence, and cost of nurses' LBP. Exercise, correct body mechanics, minimizing or removing risk factors like stress, obesity, and smoking, ergonomic adjustments, and employing patient lifting equipment are recommended measures [15].

A cross-sectional study was conducted to assess the prevalence of low back pain (LBP) and its related factors among healthcare practitioners at the University of Gondar Comprehensive and Specialized Hospital in northwest Ethiopia. The sample consisted of 423 individuals chosen through systematic random sampling techniques, and data gathering was conducted using structured self-administered questionnaires. Results revealed that more than half of the respondents, surpassing 50%, reported instances of LBP [16].

A cross-sectional investigation was undertaken to evaluate the understanding and application of body mechanics techniques among nurses at Punjab Institute of Cardiology, Lahore. The sample size consisted of 216 individuals selected via convenient sampling methods. The findings indicated that 65% of nurses possessed moderate knowledge, while 35% demonstrated insufficient knowledge regarding body mechanics techniques. Regarding practices, 60% of nurses implemented body mechanics techniques, while 40% did not. The study's conclusion emphasized the necessity for enhanced education among nurses on body mechanics to mitigate the risk of low back pain [17].

A meta-analysis was conducted to examine the occurrence of low back pain (LBP) among nurses employed in clinical settings at the College of Medicine and Health Sciences, Bahir Dar University, Ethiopia. The sample size comprised 6110 individuals selected through non-random, purposive sampling methods, adhering to predetermined criteria for data collection. The findings indicated a range in LBP prevalence rates, with the lowest being 44.1% and the highest reaching 82.7%. Utilizing the random effects model, the estimated prevalence rate of LBP among nurses was determined to be 64.07%. The subgroup analyses showed that highest prevalence of LBP among nurses was from the West Africa region with prevalence rates of 68.46%, followed by the North Africa region with prevalence rate of 67.95%. The study finding underscores the prevalence of LBP among nurses [18].

A cross-sectional investigation was carried out to examine the impact of patient handling and personal factors on the prevalence of low back pain (LBP) among nursing staff at educational hospitals affiliated with Kerman University, Iran. A total of 243 samples were randomly selected, and data were

gathered using patient transfer assessment tools. The results revealed that 69.5% of nursing personnel had experienced low back pain (LBP) within the previous year. The study identified notable associations between age, weekly working hours, years of work experience, body mass index (BMI), gender, and engagement in shift work. The study concluded that more than 90% of the participants were at medium and severe risk of LBP [19].

A cross-sectional investigation was conducted to ascertain the prevalence and intensity of low back pain (LBP) among nurses employed in intensive care units across three private and three public hospitals in Gaziantep, Turkey. A sample size of 114 nurses was selected through purposive sampling methods, and data collection involved the utilization of a questionnaire and visual analogue scale. The findings indicated that 84.2% of the nurses reported experiencing LBP, with 66.7% rating the pain as of moderate severity. It was observed that nurses who lacked education on LBP, those who endured prolonged periods of standing, and those who did not utilize supportive equipment during interventions reported higher average pain scores of 20 [20].

A cross-sectional investigation was carried out to identify the occupational factors associated with low back pain (LBP) among nurse professionals in the eastern and western Wollega zones of western Ethiopia. Through systematic random sampling, 422 participants were selected, and data collection involved the utilization of an interviewer-administered questionnaire. The findings indicated a prevalence of LBP within the past 12 months at 63.6%, with 34.2% of those affected seeking medical attention. Additionally, within the last 7 days, the prevalence stood at 53.4%, with the majority (72.2%) reporting activity limitations. The study concluded that initiatives aimed at preventing and managing back injuries should prioritize the proper regulation of workplace conditions [21]. A cross-sectional investigation was undertaken to evaluate the prevalence of low back pain (LBP) among nurses, along with occupational risk factors, at Farhat Hached Hospital in Sousse. A sample size of 203 participants was randomly selected, and data collection was conducted through self-administered questionnaires. The findings indicated that the occurrence of low back pain (LBP) within the past 12 months was 58.1%. The study emphasized the prevalence of LBP among staff nurses [22].

By the above evidence, the investigator came to know that prevalence of LBP is highly common among nurses. As health care costs continue to rise and attention is focused on providing quality, affordable, accessible health care, administrators must identify ways of saving money without sacrificing and moderately care delivery is imperative. Back injury prevention is a key health promotion and protection program for the hospital setting. Interventions that reduce compensation for work related injuries can reduce expenditures without adversely affecting care and can in fact promote improved delivery and quality of care. Hence, the investigator felt a need to conduct the study regarding the body mechanics training programme which will help the nursing officers to prevent and reduce this LBP because of improper body mechanics [23].

OBJECTIVES

This article deals with the statement of the problem, objectives of the study, operational definitions, hypothesis made in the study, limitations of the study and conceptual framework.

Objectives of the Study

- Evaluate the extent of low back pain (LBP) among nursing officers.
- Assess the impact of a body mechanics training program on decreasing LBP among nursing officers.
- To find out association between LBP scores of nursing officers with selected biophysical variables.

Operational Definitions

1. *Assess:* It is an organized and systematic process of collecting data from the nursing officers of selected hospital.

2. *Effectiveness:* Refers to the extent to which the body mechanics training programme helps to reduce the level of LBP among nursing officers.
3. *Body mechanics training programme:* Refers to the demonstration of techniques which helps to correct the bodily alignment as including standing, sitting, walking, lifting, lift an object from the floor, positioning the client, moving from sitting to standing, transferring patient from bed to bed/trolley and wheelchair.
4. *Low back pain:* Describes discomfort in the lower back region, potentially originating from issues with the lumbar spine, the intervertebral discs, and the muscles of the lower back, exacerbated by improper body mechanics.
5. *Nursing officers:* Refers to nurses who are professionally qualified and registered under Karnataka nursing council.

Hypotheses

- *H1:* There may be a significant improvement in mean post-test pain score compared to mean pretest pain score of nursing officers.
- *H2:* A notable correlation might exist between low back pain and certain biophysical characteristics among nursing officers.

Research Variables

- *Dependent variable:* LBP experienced by nursing officers.
- *Independent variable:* Body mechanics training programme to reduce the LBP among nursing officers.
- *Socio-demographic variables:* Characteristics of nursing officers such as age, religion, qualification, marital status, types of family, dietary pattern, work experience, BMI, area of working, work experience, duration of working, nurse patient ratio.

Limitation of the Study

The study is limited only to:

- Nursing officers working in KIMS Hospital and Research Centre.
- Nursing officers who are willing to participate in the study.
- Nursing officers who are available at the time of data collection.
- Assess the effectiveness of body mechanics training program on reducing LBP.

Conceptual Framework

Conceptualization refers to the process of defining abstract ideals which are formulated by generalizing particular manifestations of certain behaviours. The conceptual framework involves organizing abstract elements based on their connection to a shared theme. This facilitates communication and provides a systematic approach to the nursing research, education, administration and the practice.

This theoretical framework serves as a guide or a map to identify the defined relationship between variables. The present study's conceptual framework was derived from a modified version of Imogene M. King's goal attainment model. King's theory primarily focuses on interpersonal systems within nursing practice, asserting that nurses' distinct role lies in their actions and interactions with individuals to promote health and functioning. The core concepts of the theory include perception, action, interaction, and transaction, all of which are interconnected in various nursing scenarios (Figure 1).

Perception

Perception, defined as an individual's interpretation of reality, encompasses various elements such as receiving and organizing energy from the environment, processing and transforming information,

storing it, and subsequently expressing it through observable behaviours. In this study, researchers assess the learning requirements of nurses. Nurses, in turn, recognize the significance of proper body mechanics in mitigating low back pain among nursing personnel.

Action

Action involves the efforts undertaken by individuals to attain the goals they have perceived. In this study, it is a mutual goal setting to improve practice regarding body mechanics training programme on reducing LBP.

Investigator prepares defence and veterans pain rating scale to assess level of LBP among nursing officers and prepares demonstration training programme. The nurses are motivated to practice body mechanics on reducing LBP among nursing officers.

Interaction

Interaction pertains to the exchange of perception and communication either between an individual and their environment or among two or more individuals.

In this study, the investigator administers the defence and veterans pain rating scale to assess the level of LBP, followed by demonstration of body mechanics training programme on reducing LBP among nursing officers.

Transaction

Transaction involves a dynamic interaction process whereby individuals communicate with their environment to pursue goals that hold significance and influence human conduct. Hence in this study, there is gain in practice of body mechanics on reducing LBP among nursing officers.

REVIEW OF LITERATURE

Reviews Related to Knowledge Regarding the Body Mechanics Training Programme

A cross-sectional study was conducted to assess the knowledge, self-efficacy and practice among nurses for prevention of chronic LBP in Arak university of medical sciences, Iran. A sample size of 133 participants was chosen through random sampling methods, and structured knowledge questionnaires were employed to collect the data.

The results revealed that among 133 nurses, LBP had average level of knowledge scores of 60.2±19.69, average level of self-efficacy score of 55.9±10.6 and poor practice score of 43.9±6.9 out of 100. The study concluded that correlation between knowledge, self-efficacy and practice was not significant [24].

A single-group pretest and post-test study was carried out to evaluate the efficacy of self-instructional modules in enhancing nurses' understanding of proper body mechanics to prevent low back pain.

This study was conducted among nurses employed at the tertiary care hospital, Bhubaneswar, Odisha (PBMH, KIMS). The samples (n=60) were selected using purposive and convenience sampling techniques and the data were collected by using self-structured knowledge questionnaires.

The results revealed that was findings interpreted that in orthopaedic ward, out of 20 nurses, 45% have good knowledge, 5% have average knowledge and 50% have poor knowledge on prevention of LBP; in surgery ward, out of 20 nurses, 60% have good knowledge, 25% have average knowledge, 15% have poor knowledge on prevention of LBP; and in medicine ward, out of 20 nurses, 70% have good knowledge, 30% have average knowledge on prevention of LBP. The results of the study indicated that the self-instructional module successfully enhanced the knowledge of nurses [25].

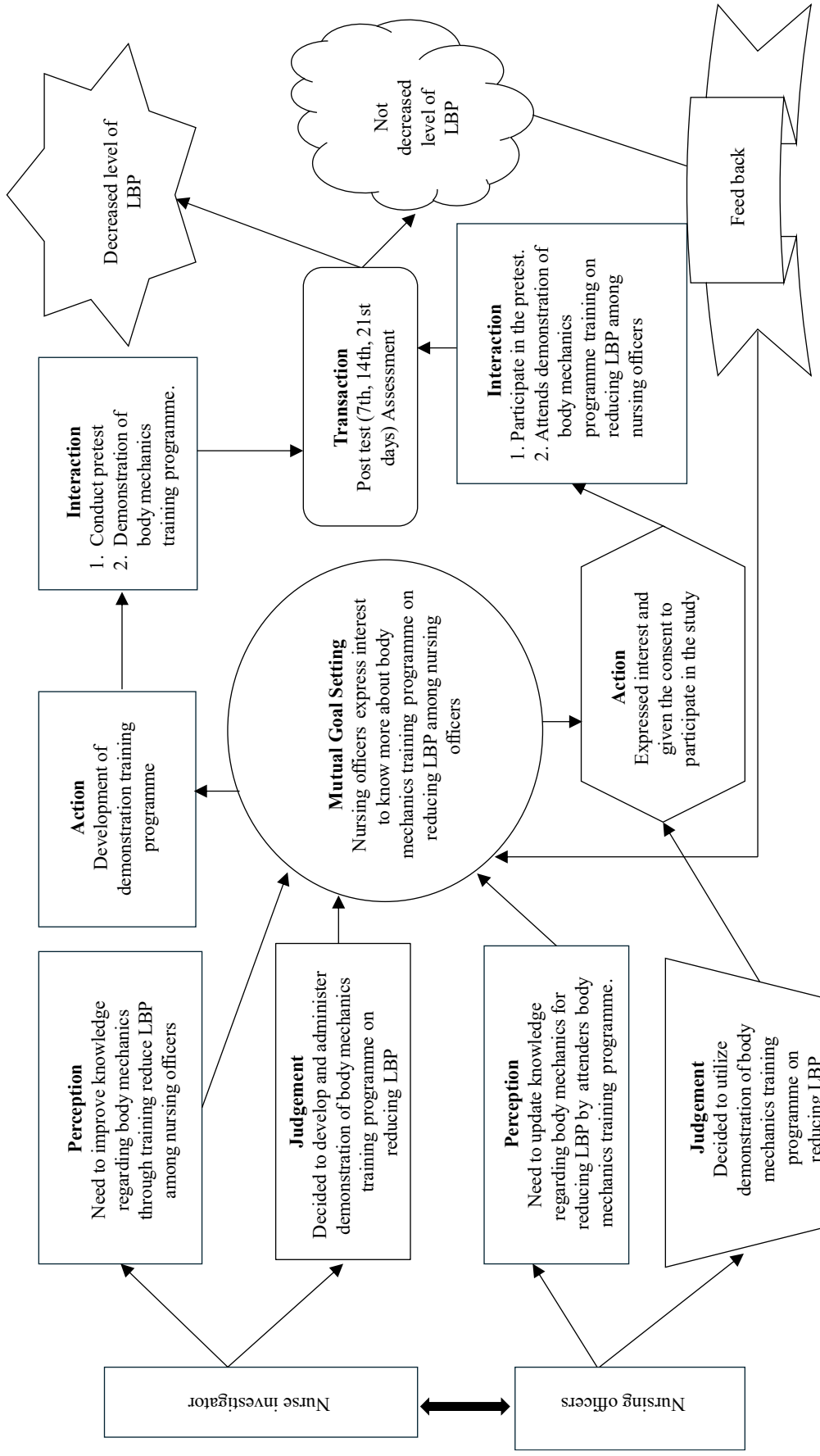

Figure 1. Conceptual framework based on Imogene M. King's Theory of Goal.

A study utilizing a one-group pretest and post-test design was carried out to evaluate the impact of a self-instructional module on critical care nurses' understanding of proper body mechanics at a chosen hospital in Moradabad. A sample size of 60 participants was selected using simple random sampling methods, and data collection was conducted through self-structured questionnaires. The findings indicated that prior to the intervention, 38.8% of nurses exhibited inadequate knowledge, 58.3% demonstrated moderate knowledge, and 3.3% possessed proficient knowledge regarding correct body mechanics. Following the intervention, 35.5% exhibited moderate knowledge, while 65% demonstrated proficient knowledge in this area. The study shows that there is remarkable improvement in the knowledge of proper body mechanics among the critical care nurses after self-instructional module [26].

A cross-sectional investigation was undertaken to evaluate the prevalence and risk factors contributing to low back pain (LBP) among nurses at a tertiary care hospital located in southern India. The samples (n=84) were selected randomly and the data were collected by using backache assessment questionnaires and assessing the severity by Oswestry Disability Index (ODI). The findings showed that 73.8% of nurses experienced low back pain, with 83.3% of them reporting minimal disability according to the Oswestry Disability Index (ODI). The study concluded that nurses in night shifts with overtime duty had a higher incidence of LBP, among nurses working in different wards, medicine, orthopaedics and ICU had higher prevalence of LBP [27].

A descriptive study was undertaken to evaluate the occupational risk factors associated with low back pain (LBP) among nurses at Ahmadu Bello University Teaching Hospital (ABUTH) in Zaria, Nigeria. Employing cluster sampling techniques, a sample size of 120 participants was selected, and data collection was facilitated through self-administered questionnaires. The findings indicated a prevalence of LBP among nurses at 82.7%. The study further noted that the duration of LBP was highest among individuals experiencing pain for less than 3 weeks (69.1%), followed by those enduring pain for over 12 weeks (12.3%). As a result, it is suggested that preventive measures against LBP should be implemented through a comprehensive approach, including raising awareness and promoting the use of safe handling techniques among nurses while on duty [28].

A mixed methods research was conducted to examine the factors influencing low back pain (LBP) among perioperative nurses in a typical teaching hospital in Nigeria. The study involved a sample size of 112 participants selected through a combination of probability and non-probability sampling methods, with data collection facilitated through self-structured knowledge questionnaires. Findings indicated that more than 40% of participants had 6–10 years of work experience, with over 50% reporting experiencing LBP on a weekly basis. Additionally, over 60% requested excused duties monthly due to workplace stress and LBP. The study's conclusion emphasized the importance of training perioperative nurses in proper body mechanics by occupational health nurses and other relevant stakeholders to reduce the occurrence of practices that may contribute to LBP [29].

A cross-sectional study was conducted to determine the prevalence of low back pain (LBP) and the factors associated with it among nurses at King Abdulaziz University Hospital (KAUH) in Jeddah, Saudi Arabia. Utilizing convenience sampling methods, a sample size of 234 participants was selected, and data collection was facilitated through self-administered questionnaires. The findings indicated an LBP prevalence of 82.9%, an annual prevalence of 85.5%, and a 1-week prevalence of 53.6%. The study's conclusion emphasized that these findings could assist policymakers in implementing effective strategies aimed at alleviating the burden and difficulties posed by LBP among nurses [30].

A cross-sectional investigation was carried out to identify the factors associated with low back pain (LBP) among nursing staff at the National Medical College and Teaching Hospital in Birganj. A total of 101 participants were included in the study, selected through a combination of probability and non-probability sampling methods, with data collected using semi-structured questionnaires. Findings indicated that 78.2% of nursing personnel had experienced LBP, with 49.5% reporting mild pain,

23.8% experiencing moderate pain, and only 5% suffering from severe pain. The study concluded that LBP is prevalent among nursing staff, highlighting a concerning trend of many nurses not seeking treatment for their condition. This underscores the urgent need to prioritize the health and well-being of these frontline healthcare workers, given the multifactorial nature of factors contributing to LBP among them [31].

A pre-experimental study employing a one-group pretest and post-test design was conducted to assess the impact of a training program on nurses' knowledge concerning body mechanics and selected nursing procedures aimed at preventing low back pain (LBP) at Fortis Hospital. 30 participants were included in the study, selected through non-probability convenient sampling methods, and data were gathered using self-administered questionnaires. Findings revealed that among the participant nurses, 46.6% exhibited inadequate knowledge, while 53.3% demonstrated moderate knowledge. The study concluded that there is a need for further education among nurses regarding proper body mechanics, as it plays a significant role in preventing LBP [32].

A cross-sectional study was conducted to evaluate the prevalence and efficacy of interventions for low back pain (LBP) among nurses in Najran, Saudi Arabia. A sample size of 187 participants was selected through purposive sampling methods, and data collection was facilitated using self-administered questionnaires. Findings indicated that 74.8% of participating nurses reported experiencing LBP, with 88.2% of them describing the pain as moderate and localized. The study's results suggested the implementation of policies and interventions aimed at mitigating the risk and occurrence of LBP among nurses [33].

A cross-sectional investigation was undertaken to evaluate the proficiency and application of body mechanics techniques among nurses at Gujarat University. The sample, comprising 301 participants, was selected through purposive sampling methods, and data were collected via structured knowledge questionnaires. Findings indicated that 41.4% of the nurses possessed moderate knowledge, with 2.1% demonstrating poor knowledge regarding body mechanics. The study observed a marginal positive association with knowledge of body mechanics. The study's conclusion emphasized the necessity for enhanced education among nurses concerning body mechanics as a measure to prevent low back pain (LBP) [34].

A cross-sectional investigation was undertaken to evaluate the extent of understanding regarding the application of body mechanics and safety precautions among ward attendants in Dehradun, Uttarakhand. A sample size of 29 participants was randomly selected using simple random sampling methods, and data collection was facilitated through knowledge questionnaires. The results revealed that 79% of the study participants had no back pain, while the remaining 21% were suffering from LBP, primarily due to heavy lifting (62%) and having a thin body build (77%). The study concluded that 70% participants had an average level of knowledge. The study findings highlighted the need for LBP prevention training programme [5].

Reviews Related to Effectiveness of the Body Mechanics Training Programme

A cross-sectional investigation was carried out to evaluate the understanding and application of body mechanics among nurses at IMS and Sum Hospital, Odisha. A sample size of 100 participants was chosen through purposive sampling methods, and data collection was accomplished via knowledge questionnaires. The results revealed that among the participants, out of 100 nurses, 71% had moderate practice, 18% had mild practice, 42% had moderate knowledge, and 2% had poor knowledge. The study concluded that the nurses still needed more practice and knowledge about prevention of LBP [34].

A cross-sectional investigation was conducted to evaluate the occurrence of lower back pain (LBP) among nurses at Christian Medical College in Vellore, South India. A total of 1284 participants were included in the study, selected using both probability and non-probability sampling methods, and data

were collected through self-administered questionnaires. The findings indicated that 53.4% of the nurses experienced LBP, with 17.1% classified as being at high risk. Significant correlations ($p<0.001$) were observed between LBP and factors such as age, body mass index, years of experience, and workplace environment. The study suggested that regular education focusing on proper body posture, physical fitness, and correct body mechanics could contribute to the prevention of LBP among nurses [35].

A pre-experimental study employing a one-group pretest and post-test design was conducted to assess the impact of a structured teaching program on nursing students' understanding of body mechanics in a chosen nursing college in Mangalore taluk. Structured knowledge questionnaires were utilized to collect data from 60 participants selected through a simple random sampling method. The findings demonstrated a notable increase in mean post-test percentage (83.89%) compared to the mean pretest percentage (49.33%). The study indicated a significant disparity between the mean pretest and post-test knowledge scores concerning body mechanics among nursing students, suggesting the effectiveness of the planned teaching program [36].

A cross-sectional survey was conducted to evaluate the occurrence of lower back pain (LBP) among nurses employed in public hospitals in Eastern Ethiopia. A sample size of 404 participants was selected through simple random sampling, and data were gathered via self-administered questionnaires. The findings indicated a 12-month prevalence of LBP at 38.1%. Significantly, 65% of the cases involved female nurses, and 32.5% of the cases had more than 5 years of work experience, both factors being closely linked to the occurrence of LBP. The study recommended tailored interventions to prevent further injuries among nurses and to retain experienced nursing staff [9].

A cross-sectional investigation was carried out to identify the factors contributing to lower back pain (LBP) among nurses working in critical care units at Hospital Universiti Sains Malaysia. Using a simple random sampling method, 110 participants were selected, and data were gathered through self-administered questionnaires. The findings revealed a notable prevalence of LBP among nurses, with 16.4% reporting LBP prior to nursing and 68.2% experiencing LBP since beginning their nursing careers. The study concluded that the primary approach to preventing LBP among nurses lies in enhancing manual handling techniques when transferring patients within the wards [15].

A thorough meta-analysis was conducted to assess the impact of manual handling training and lifting aids on the incidence of back pain among nurses in different parts of India. The study encompassed data from 15 studies obtained through academic electronic databases such as ScienceDirect, MEDLINE, and CINAHL. The findings underscored the significance of manual handling training programs and consistent utilization of lifting devices in mitigating the occurrence of lower back pain (LBP). Factors such as ergonomics training, correct body mechanics and posture, utilization of body slings, workplace conditions, and factors related to nurses' knowledge, experience, attitude, and compliance were identified as crucial in influencing LBP. The study findings indicated that both manual handling training initiatives and the introduction of patient lifting aids are effective measures in reducing the occurrence of low back pain among nurses [10].

A comprehensive meta-analysis was performed to explore the frequency of lower back pain (LBP) and the factors linked to it among healthcare workers in hospital environments. The study included data from 154 studies for analysis. The findings revealed that the estimated lifetime prevalence of LBP among healthcare personnel was 54.8%. Additionally, the estimated odds ratios indicated correlations between LBP and various factors, including age (1.23%), female gender (1.11%), BMI (1.17%), lack of physical activity (1.56%), occupational factors (1.12%), patient-related factors (1.24%), body position at work (2.55%), and stress (1.67%). The research concluded that the prevalence of LBP among healthcare personnel is substantial, emphasizing the need for future studies and educational programs aimed at reducing its incidence in this population [3].

A descriptive correlational study was undertaken to investigate the prevalence of lower back pain (LBP) among nurses at a hospital in Riyadh, as well as its associated factors and impact on daily activities. The sample size comprised 352 participants selected through cluster sampling, and data were gathered using questionnaires and the Oswestry Disability Index. The findings indicated a prevalence of LBP among the sample at 79%, with the disability scores indicating that a majority of the nurses experienced moderate to severe disabilities. The study recommended the implementation of a comprehensive educational program aimed at promoting effective body mechanics and assessing its efficacy among nurses [12].

A quasi-experimental research project was undertaken to assess the impact of school programs on lower back pain (LBP) and functional disability among Iranian nurses at Ahvaz Jundishapur University of Medical Sciences, located in Ahvaz, Iran. The samples (n=64) were selected using random sampling techniques and the data were collected using self-report visual analogue scales and Roland-Morris's disability questionnaires. The nurses were referred to a physiotherapist for a 3 h training programme. The results revealed that functional disability scores of post-test mean was 0.575 compared to pre-test scores of 0.844. The study provided evidence of effectiveness of body mechanics training programme in reducing LBP [14].

A quasi-experimental study was conducted to evaluate the effect of the body mechanics training program of intensive care unit in reducing LBP at Tanta university hospital, Egypt. The participants (n=42) were chosen through purposive sampling, and data collection was conducted via self-administered questionnaires. The study results revealed that 65% had LBP, the majority of 80% had reduced work and 50% consulted physiotherapists. This study concluded that body mechanics knowledge is essential among nurses reporting LBP [2].

A cross-sectional study was conducted to assess the prevalence of LBP and knowledge on body mechanics among the nursing officers in Jawaharlal institute of postgraduate medical education and research, Pondicherry. Convenience sampling methods were utilized to select the participants (n=384), and data collection was facilitated through a self-administered questionnaire. The findings indicated that out of the 384 nurses surveyed, 285 (74.2%) reported experiencing LBP, with severe pain reported by 16 (4.2%) participants. The study's conclusion emphasized that nurses exhibited a commendable understanding of body mechanics, reflected in an average score of 15.02. Moreover, it underscored the importance of timely interventions in mitigating the onset of LBP [6].

A pre-test/post-test study was conducted in four hospitals in Bolu, Turkey, aiming to assess the impact of an educational program on preventing LBP among nurses. 60 nurses were involved in the research, undergoing an assessment of their knowledge before and after the training through structured questionnaires. Alongside, they were given informational booklets regarding the prevention of LBP. The results demonstrated a notable rise in the average post-test knowledge score (20.97) in comparison to the pretest score (15.33) at a significance level of $p<0.05$. These findings imply that nurse education enhances after training, a critical aspect in preventing LBP.

Another study, employing a similar design, was conducted in West Black Sea, Turkey, with 60 nurses selected using simple random sampling techniques. Data were collected through self-administered questionnaires, assessing mean knowledge scores of nurses before, immediately after, and 3 months post-training aimed at preventing LBP. The mean knowledge score increased from 15.33 before training to 20.97 immediately after, then slightly decreased to 19.87 3 months later. The study concluded that nurses exhibited higher mean knowledge and procedural scores 3 months after training compared to before training [8].

METHODOLOGY

This study explores the methodology employed by the researcher, which serves as a systematic approach to addressing research inquiries. It encompasses the structured procedure followed by the

researcher, from initial problem identification to reaching a final conclusion. Research methodology outlines the overall framework for systematically collecting valid and reliable data for investigation purposes. The study aimed to evaluate the efficacy of a body mechanics training program in reducing low back pain among Nursing officers.

The procedures involved in gathering and organizing the collected data included: determining the research approach, selecting the research design, specifying the setting, defining the target population, determining the sample size and employing sampling techniques, establishing criteria for sample selection, developing and describing research tools, conducting a pilot study, outlining the data collection process, and formulating a plan for data analysis.

Research Approach

Considering the chosen issue's characteristics and the intended goals, an experimental method was deemed suitable for this study.

Research Design

A quasi-experimental design, specifically a one-group pre-test and post-test time series design, was chosen to evaluate the impact of a body mechanics training program on lower back pain among nursing officers (Figure 2 and Table 1).

Key

- *O_1:* Pre-test: before administering the body mechanics training programme on the 1st day assessing the level of LBP by using Defence and veterans pain rating scale was used.
- *X:* Demonstration of body mechanics training programme.
- *O_2:* After administering a body mechanics training programme on the 7th day assessing the level of LBP by using Defence and veterans pain rating scale was used.
- *O3:* After administering a body mechanics training programme on the 14th day assessing the level of LBP by using Defence and veterans pain rating scale was used.
- *O4:* After administering a body mechanics training programme on the 21st day assessing the level of LBP by using Defence and veterans pain rating scale was used.

Variables under Study

- *Independent variable (IV):* Body mechanics training programme to reduce the LBP among nursing officers.
- *Dependent variable (DV):* LBP experienced by nursing officers.
- *Socio-demographic variables:* Characteristics of nursing officers such as age, religion, qualification, marital status, types of family, dietary pattern, work experience, BMI, area of working, work experience, duration of working, nurse patient ratio.

Setting of the Study

The research was carried out at KIMS Hospital and Research Centre in Bangalore. These settings were chosen based on their proximity, feasibility for conducting the study, availability of the necessary sample, and the investigator's familiarity with them.

Population

The study focused on registered nursing officers employed at a specific hospital in Bangalore, Karnataka as the target population.

Table 1. Schematic representation of research design.

Pre-test	Intervention	Post-test		
O_1	X	O_2	O_3	O_4

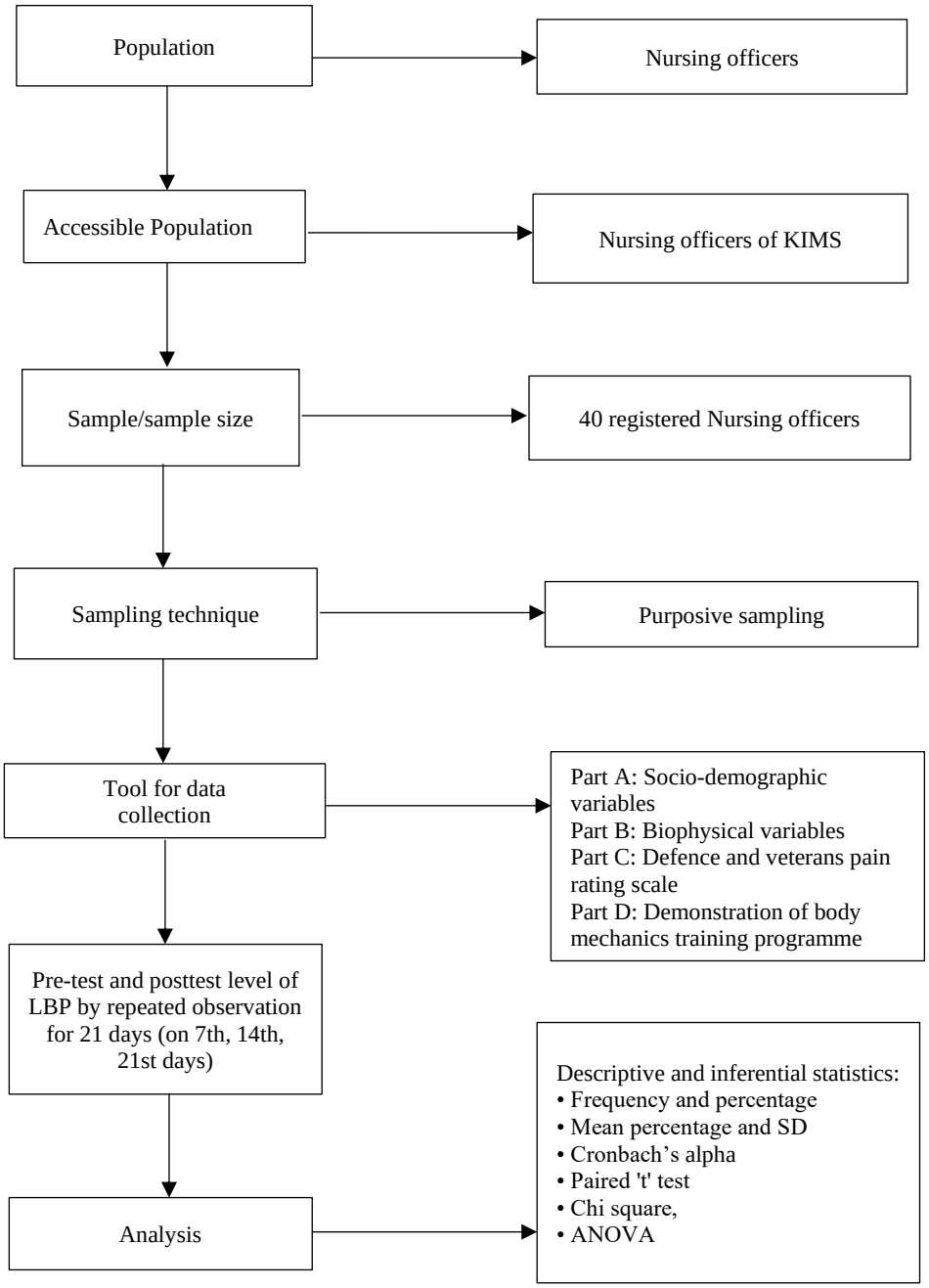

Figure 2. Schematic presentation of research design.

Sample and Sampling Technique

The sample consists of registered nursing officers working those who fulfil the inclusive and exclusive criteria. In the study, purposive sampling techniques were used for the selection of nursing officers working at KIMS hospital and Research Centre, Bangalore.

Criteria for Selection of the Sample

Inclusion criteria

1. Nursing officers who are willing to participate and those are signing the informed consent voluntarily.
2. Nursing officers who are experiencing LBP.
3. Nursing officers aged between 30 and 50 years.
4. Female nursing officers.

Exclusion criteria

1. Nursing officers those have undergone the body mechanics training programme.
2. Nursing officers those are having IVDP.
3. Nursing officers those underwent any spinal surgery.
4. Nursing officers those are practicing yoga.
5. Nursing officers those are pregnant.
6. Nursing officers who are male.
7. Nursing officers who attained menopausal.

Sample size

The sample size for the present study was 40 nursing officers.

Selection and Development of Tool

The study utilized a pain rating scale specifically designed for defence personnel and veterans. It was considered to be the most appropriate instrument to elicit the response and the response was no pain (0) mild pain (1–3), moderate pain (4–6), severe pain (7–10) from subjects.

Development of the Tool

A defence and veterans pain rating scale was chosen to evaluate the LBP experienced by nursing officers. The process involved in developing the tool includes:

- Reviewing existing literature.
- Ensuring validity and reliability.

Description of the Tool

In the present study, the following tools were used:

- *Part-I:* The questionnaire comprised 9 items pertaining to the socio-demographic information of the participants, including age, religious affiliation, educational attainment, marital status, number of children, household structure, family income, dietary habits, and work experience.
- *Part-II:* The questionnaire included 10 items concerning the biophysical characteristics of the participants, including measurements such as height and weight to calculate BMI, the department of employment, frequency of patient lifting, length of work shifts, nurse-to-patient ratio, and overall health status.
- *Part-III:* The pain rating scale used was the Defence and Veterans Pain Rating Scale.
- *Part-IV:* Presentation of the body mechanics training program.

Content Validity of the Tool

Content validity, which assesses how well an instrument measures its intended construct, was ensured by gathering input from experts. 15 experts, comprising 11 nurse educators specializing in Medical Surgical Nursing, one physician, one English professor, and two statisticians, participated in the validation process. Adjustments were implemented based on their recommendations and suggestions. Following consultation with a guide and a statistician, the final version of the tool was refined, confirming its validity and appropriateness for use.

Reliability of the Tool

After validation, the tool was subjected to reliability testing. The Defence and Veterans Pain Rating Scale was administered to 10 participants, and its reliability was assessed using Cronbach's alpha formula. Lee Cronbach was consulted to ascertain the reliability of the test. The full test's reliability was determined using the Cronbach's alpha formula:

$$a = \left(\frac{k}{k-1}\right)_{\boldsymbol{h}} \left(\frac{s^2 - \sum_i^2 s}{s^2 y}\right)$$

Where,
K=Number of items,
$\sum_i^2 s$=The sum of the variances of each item, and
s^2y=The variance of the total column.

The tool's reliability was assessed through Cronbach's alpha analysis. The Cronbach's alpha values for the socio-demographic variables and the body mechanics training program were 0.71 and 0.77, respectively. This indicated that the tool was reliable, and the study was deemed feasible.

PILOT STUDY

A pilot study was conducted at Rangadore Memorial Hospital, Bangalore, from May 2, 2022, to May 22, 2022. Permission was obtained from the Medical Superintendent to conduct the pilot study. The objectives of the pilot study were to:

- Evaluate the impact of the body mechanics training program on alleviating LBP.
- Assess the practicality of executing the final study.
- Determine the statistical analysis methodology.

Following the selection of 10 nursing officers through purposive sampling, the pre-test was conducted using the defence and veterans pain rating scale. Subsequently, on the same day, a demonstration on body mechanics was presented to the participants.

The post-test level of LBP was a repeated observation for a period of 21 days (on 7th, 14th, 21st days) by using the same defence and veterans pain rating scale to assess the effectiveness of body mechanics training program on reducing the LBP. Majority (50.0%) of the nursing officers in pilot study had moderate pain, followed by 40.0% study participants who had severe LBP and only one had mild LBP. Pilot study results indicate that the majority of nursing officers either had moderate or severe LBP.

Analysis of variance in Table 2 depicts that LBP score had decreased significantly in three follow up readings with f-value =5.5 and smaller p-value 0.003. It was concluded that the body mechanism training program was effective in reducing pain among the study participants.

PROCEDURE FOR DATA COLLECTION

Upon securing approval from the institutional ethics committee, the investigators introduced themselves to the participants.

- *Phase-I:* The data were gathered subsequent to acquiring authorization from the relevant authority and obtaining consent from the nursing officers, with a clear explanation provided regarding the study's objectives.
- *Phase II:* The investigator conducted the pre-test on the first day by using defence and veterans pain rating scale. After the pre-test, demonstration of body mechanics training programme will be provided for the nursing officers regarding reducing LBP.
- *Phase III:* Post-test was conducted consecutively on 7th, 14th, and 21st day, and the same tool was used to compare differences between observations.

Period of Data Collection

The data collected was carried out in, KIMS Hospital and Research Centre, Bangalore from 02-06-2022 to 22-06-2022.

PLAN FOR DATA ANALYSIS

Descriptive statistics

The investigator used appropriate descriptive statistics like mean, median, and standard deviation to assess the difference between pretest and post-test of LBP score. Frequency and percentage were used to assess the association with LBP and biophysical variables.

Inferential statistics

- For analysing the variance between pre-test and post-test knowledge scores of LBP, a paired t-test was employed.
- To investigate the correlation between pain score and selected biophysical variables, either a chi-square test or an F-test was utilized.
- The effectiveness of the body mechanics program was assessed through repeated measures of one-way ANOVA.

SAMPLE SIZE ESTIMATION

The sample size was calculated based on the population of the study according to Slovin's formula. The sample size was estimated using the formula:

$$n = \frac{N}{1+Ne^2}$$

Where,

n= required sample size,
N= Total population (60), and
e= Error tolerance (0.08).

$$n = \frac{60}{1+60(0.08)^2}$$

$$n = \frac{60}{1+60(0.0064)}$$

$$n = \frac{60}{1+0.384}$$

$$n = \frac{60}{.384}1$$

n=43.35

According to the calculations, the suggested sample size for estimation was N=43.35. Therefore, the study was conducted with a sample size of 40 after consulting with experts.

RESULTS

To derive meaningful insights into the research questions, the gathered data needs to be systematically processed and analysed to uncover patterns and relationships. Analysis involves organizing, manipulating, and summarizing data to address the research inquiries effectively. The interpretation of tabulated data sheds light on the true significance and implications of the findings.

In this investigation, a quasi-experimental methodology was employed to evaluate the impact of a body mechanics training program on alleviating low back pain among nursing officers at a designated hospital in Bangalore, Karnataka. The study comprised a sample of 40 nursing officers. Collected data was meticulously tabulated, analysed, and interpreted using both descriptive and inferential statistical techniques in alignment with the study's objectives. Analysis was conducted in accordance with the study's objectives and hypotheses, with a significance level set at 0.05%.

Part-A: Socio-demographic variables

Table 2 and Figure 3 revealed that the majority 80.0% of the nursing officers were between the age group 30–40 years and remaining 20.0% of the nursing officers were between 41 and 50 years of age.

Table 3 and Figure 4 revealed that the majority 87.5% of the nursing officers were Hindus, followed by 10.0% nursing officers were Christians, and only 2.5% of the nursing officers were Muslims.

Table 4 and Figure 5 revealed that the majority 80.0% of the nursing officers were GNM and very few 15.0 and 5.0% of the nursing officers were PB Bsc and BSc nursing graduates respectively.

Table 5 and Figure 6 revealed the distribution of the nursing officers according to their Marital status. The table indicates that 100% of nurses were married.

Table 6 and Figure 7 revealed that the majority (42.5%) of the nursing officers had one and two children respectively, and only 5.0% of the nursing officers had no children.

Table 7 and Figure 8 revealed that majority (70.0%) of the nursing officers belonged to the nuclear family and remaining 30.0% nursing officers belonged to the joint family.

Table 2. Frequency and Percentage distribution of the nursing officers according to their age.

S.N.	Age (years)	Frequency	Percentage (%)
1	30–40	32	80.0
2	41–50	08	20.0

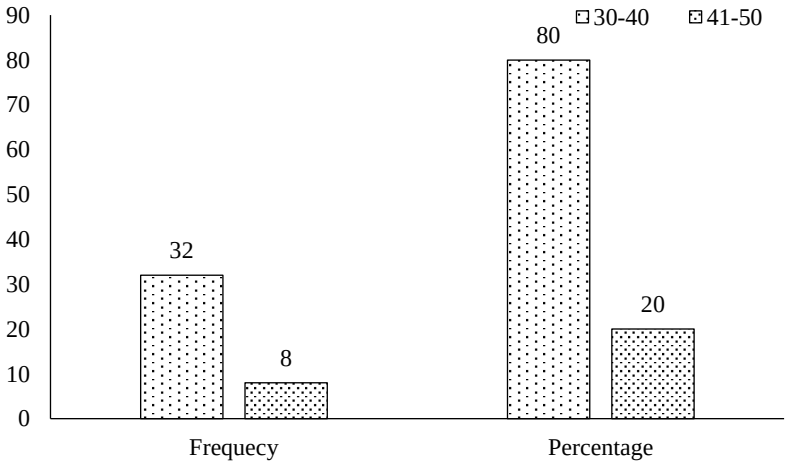

Figure 3. Frequency and Percentage distribution of the nursing officers according to their age.

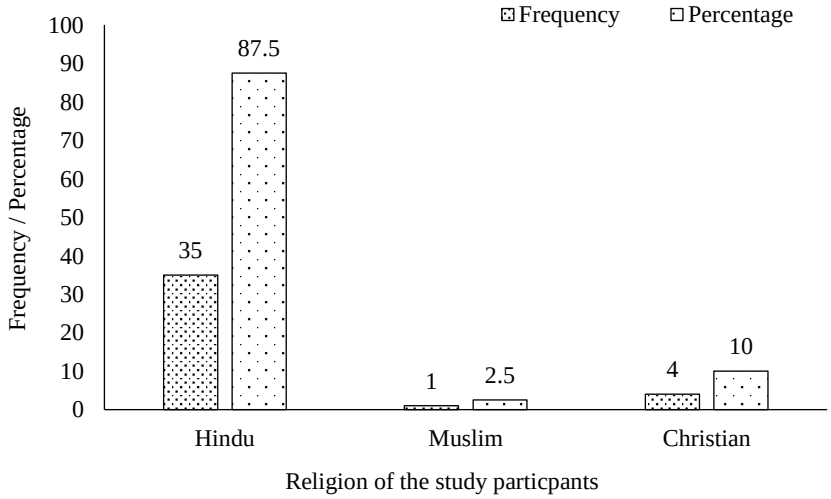

Figure 4. Frequency and Percentage distribution of the nursing officers according to their Religion.

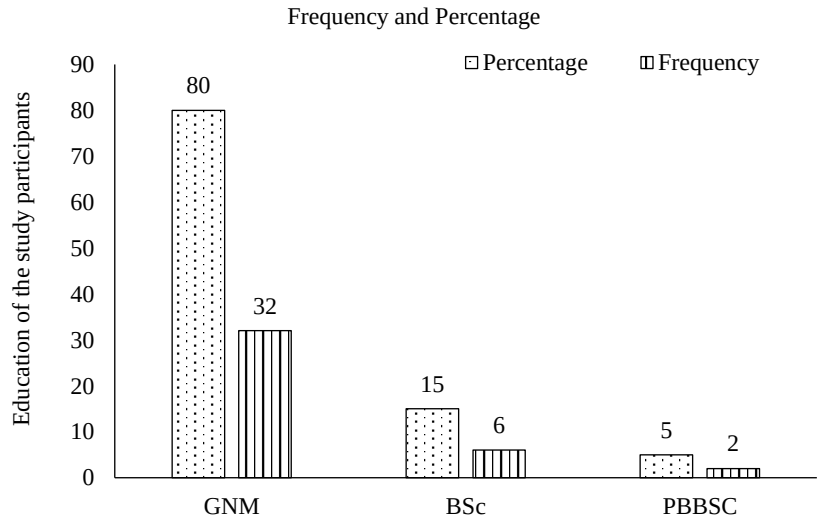

Figure 5. Frequency and Percentage distribution of the nursing officers according to their qualification.

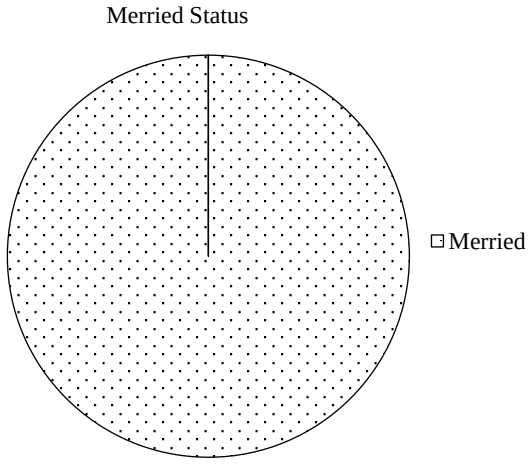

Figure 6. Frequency and Percentage distribution of the nursing officers according to their Marital status.

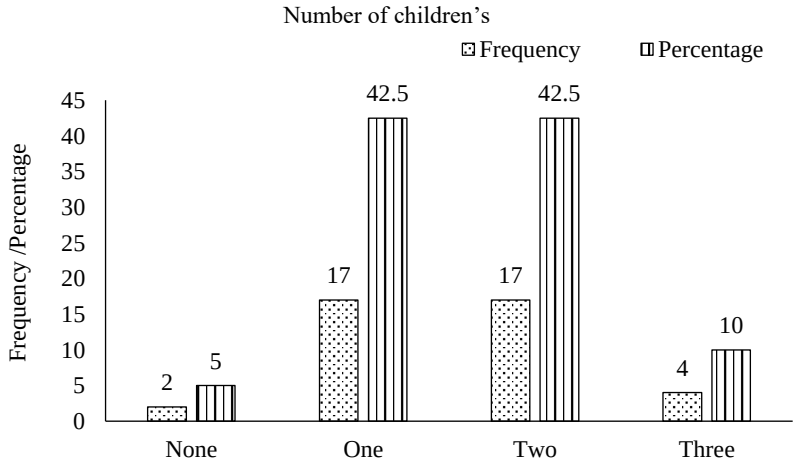

Figure 7. Frequency and Percentage distribution of the nursing officers according to their number of children.

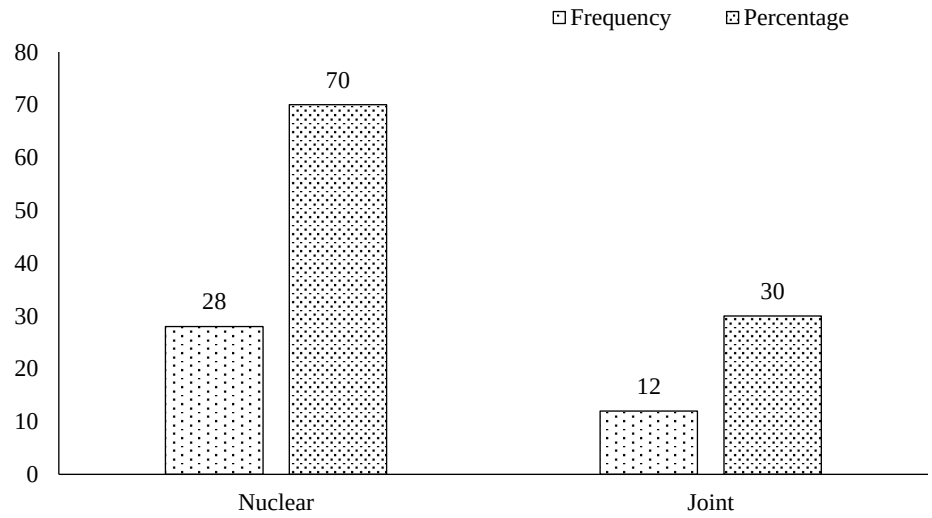

Figure 8. Frequency and Percentage distribution of the nursing officers according to their Types of family.

Table 3. Frequency and Percentage distribution of the nursing officers according to their religion.

S. No.	Religion	Frequency	Percentage (%)
1	Hindu	35	87.5
2	Muslim	01	2.5
3	Christian	04	10.0
	Total	40	100.0

Table 4. Frequency and Percentage distribution of the nursing officers according to their qualification.

S. No.	Qualification	Frequency	Percentage (%)
1	GNM	32	80.0
2	BSc	06	15.0
3	PBBSC	02	5.0
	Total	40	100.0

Table 5. Frequency and Percentage distribution of the nursing officers according to their Marital status.

S. No.	Marital Status	Frequency	Percentage (%)
1	Married	40	100

Table 6. Frequency and Percentage distribution of the nursing officers according to their number of Children.

S. No.	Number of children	Frequency	Percentage (%)
1	None	02	5.0
2	One	17	42.5
3	Two	17	42.5
4	Three	04	10.0
	Total	40	100.0

Table 7. Frequency and Percentage distribution of the nursing officers according to their Types of family.

S. No.	Types of family	Frequency	Percentage (%)
1	Nuclear	28	70.0
2	Joint	12	30.0
	Total	40	100.0

Table 8. Frequency and Percentage distribution of the nursing officers according to their income.

S. No.	Income (Rs.)	Frequency	Percentage (%)
1	20000–25000	25	62.5
2	26000–31000	11	27.5
3	32000–37000	04	10.0
	Total	40	100.0

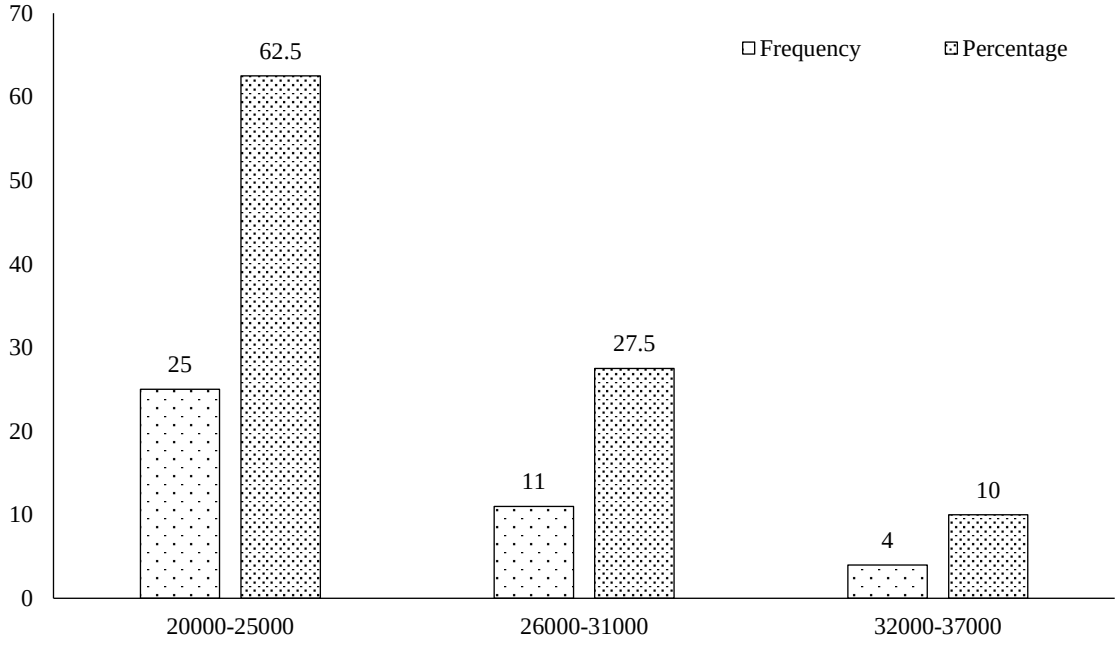

Figure 9. Frequency and Percentage distribution of the nursing officers according to their income.

Table 8 and Figure 9 revealed that the majority 62.5% of the nursing officers had income between Rs. 20000 and 25000, followed by 27.5% who had income between Rs. 26000 and 31000, and only 10.0% nursing officers had income between Rs. 32000 and 37000.

Table 9 and Figure 10 observed that the majority (87.5%) of the nursing officers were mixed dietary and remaining 12.5% nursing officers were vegetarians.

Table 10 and Figure 11 revealed that the majority (70.0%) of the nursing officers had more than 10 years of experience followed by 22.5% who had experience between 5 and 10 years and only 7.5% of the nursing officers had less than 5 years of experience.

Part-B: Biophysical variables

Table 11 and Figure 12 observed that majority (52.5%) of the nursing officers had healthy weight, 37.5% were overweight and only few 2.5 and 7.5% of the nursing officers were underweight and obese respectively.

Table 12 and Figure 13 revealed that, majority (37.5%) of the nursing officers were working in orthopaedic ward, 27.5% were working in ICU, 17.5% in Emergency ward, 10.0% in SICU and 7.5% were working in medicine ward.

Table 13 and Figure 14 revealed that the majority (55.0%) of the nursing officers lift more than 30 patients/day, 27.5% lifts 16–30 patients/day and only 17.5% lifts less than 15 patients/day.

Table 9. Frequency and Percentage distribution of the nursing officers according to their dietary habit.

S. No.	Dietary habit	Frequency	Percentage (%)
1	Vegetarian	05	12.5
2	Mixed	35	87.5
	Total	40	100.0

Table 10. Frequency and Percentage distribution of the nursing officers according to their Experience.

S. No.	Experience (years)	Frequency	Percentage (%)
1	<5	03	7.5
2	5 to 10	09	22.5
3	>10	28	70.0
	Total	40	100.0

Table 11. Frequency and Percentage distribution of the nursing officers according to their BMI.

S. No.	BMI	Frequency	Percentage (%)
1	Underweight	01	2.5
2	Healthy weight	21	52.5
3	Overweight	15	37.5
4	Obese	03	7.5
	Total	40	100.0

Table 12. Frequency and Percentage distribution of the nursing officers according to their area of working.

S. No.	Area of working	Frequency	Percentage (%)
1	Emergency	07	17.5
2	ICU	11	27.5
3	SICU	04	10.0
4	Medicine ward	03	7.5
5	Orthopaedic ward	15	37.5
	Total	40	100.0

Table 13. Frequency and Percentage distribution of the nursing officers according to their Number of lifting.

S. No.	Number of lifting	Frequency	Percentage (%)
1	<15	07	17.5
2	16–30	11	27.5
3	>30	22	55.0
	Total	40	100.0

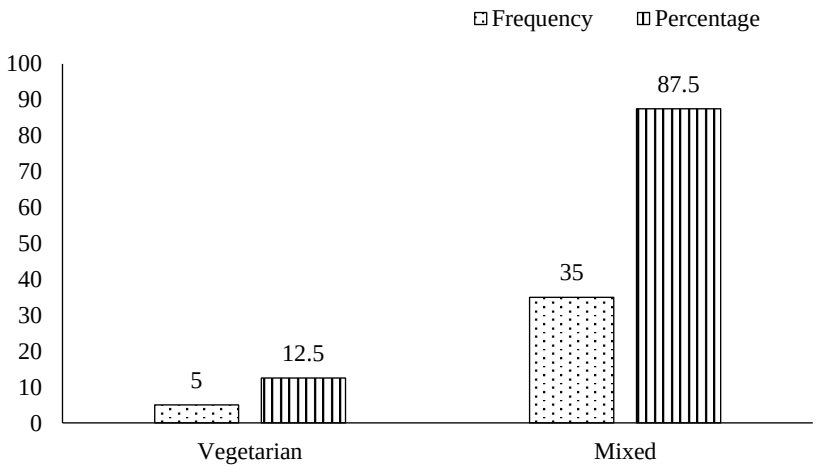

Figure 10. Frequency and Percentage distribution of the nursing officers according to their dietary habit.

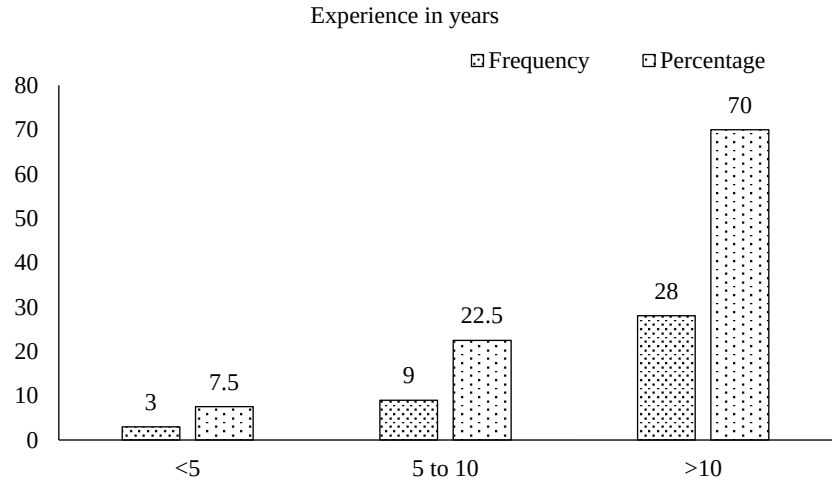

Figure 11. Frequency and Percentage distribution of the nursing officers according to their Experience.

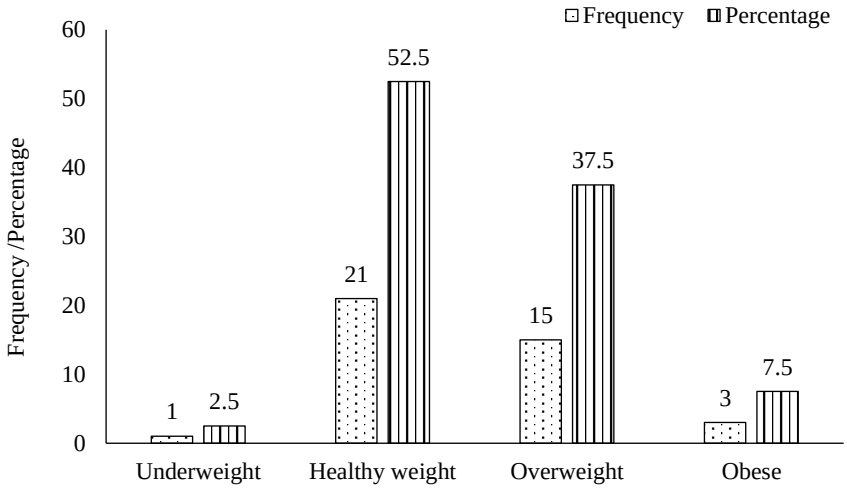

Figure 12. Frequency and Percentage distribution of the nursing officers according to their BMI.

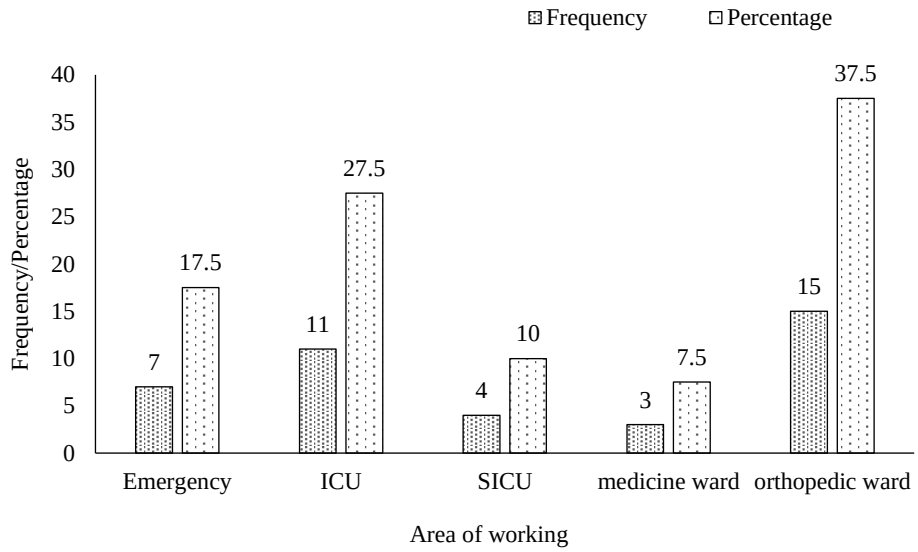

Figure 13. Frequency and Percentage distribution of the nursing officers according to their area of working.

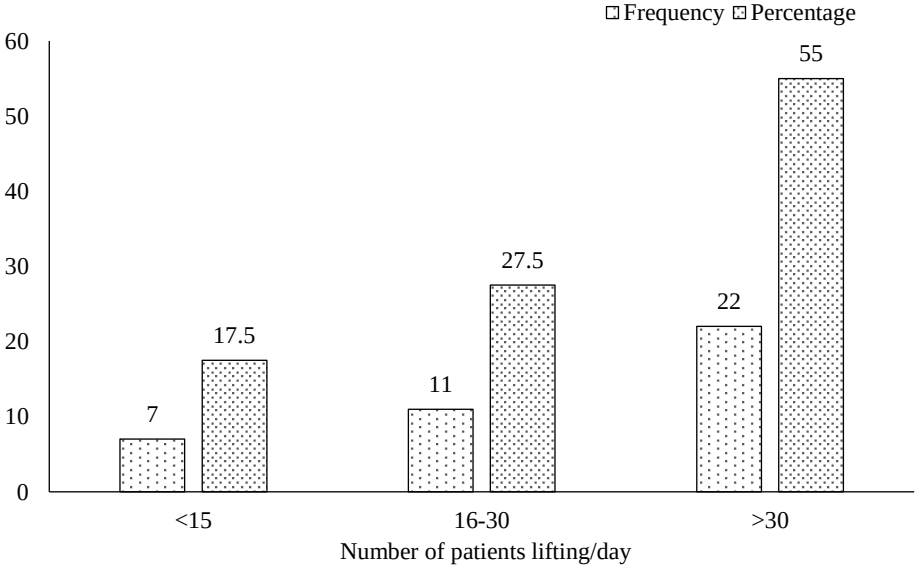

Figure 14. Frequency and Percentage distribution of the nursing officers according to their Number of lifting.

Table 14 and Figure 15 revealed that the majority (42.5%) of the nursing officers had 10 patients per shift followed by 27.5% had 2 patients per shift, 22.5% of had 6 patients per shift and 5 and 2.5% of nursing officers had 8 and 5 patients per shift.

Table 15 and Figure 16 revealed that the majority (55.0%) of the nursing officers had LBP, followed by 37.5% of the nursing officers who had severe LBP and only 7.5% of the nursing officers had mild LBP.

Table 16 and Figure 17 observed that the level of low back slowly reduced during observation-I, observation-II and observation-I respectively.

Table 17 and Figure 18 revealed that the body mechanism training program was effective in reducing pain score significantly with p-values<0.0001. Hence body mechanism training programs can reduce low back pain significantly.

Table 14. Frequency and Percentage distribution of the nursing officers according to their Nurse-patients ratio.

S. No.	Nurse-patients ratio	Frequency	Percentage (%)
1	2 patients	11	27.5
2	5 patients	01	2.5
3	6 patients	09	22.5
4	8 patients	02	5.0
5	10 patients	17	42.5
	Total	40	100.0

Table 15. Frequency and percentage distribution of level of LBP among the nursing officers.

S. No.	Level of low back pain	Frequency	Percentage (%)
1	Mild	03	7.5
2	Moderate	22	55.0
3	Severe	15	37.5
	Total	40	100.0

Table 16. Comparison of pretest LBP among the nursing officers after body mechanism training program.

S. No.	Level of low back pain	Pretest	Observation-I	Observation-II	Observation-III
1	No pain	00	00	00	08
2	Mild	03	5	13	24
3	Moderate	22	30	27	08
4	Severe	15	5	00	00
	Total	40	40	40	40

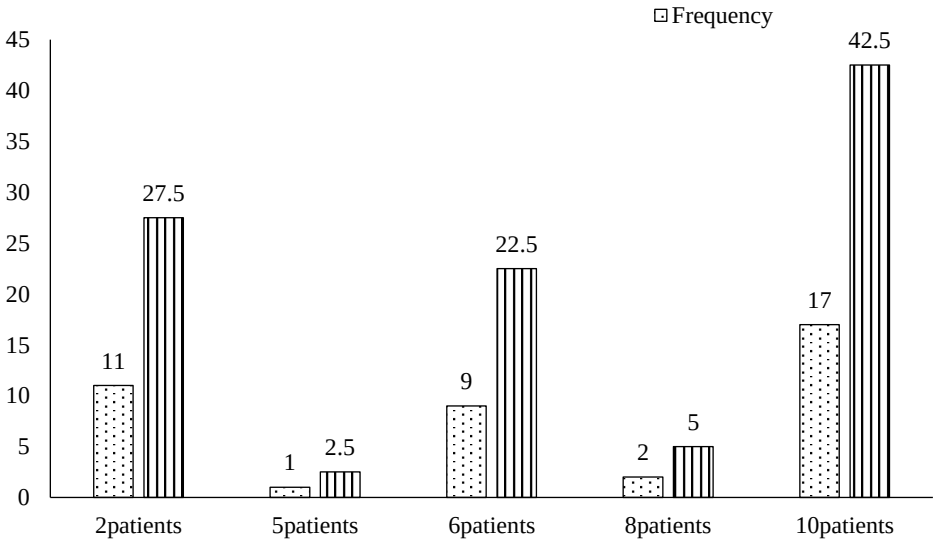

Figure 15. Frequency and Percentage distribution of the nursing officers according to their Nurse-patients ratio.

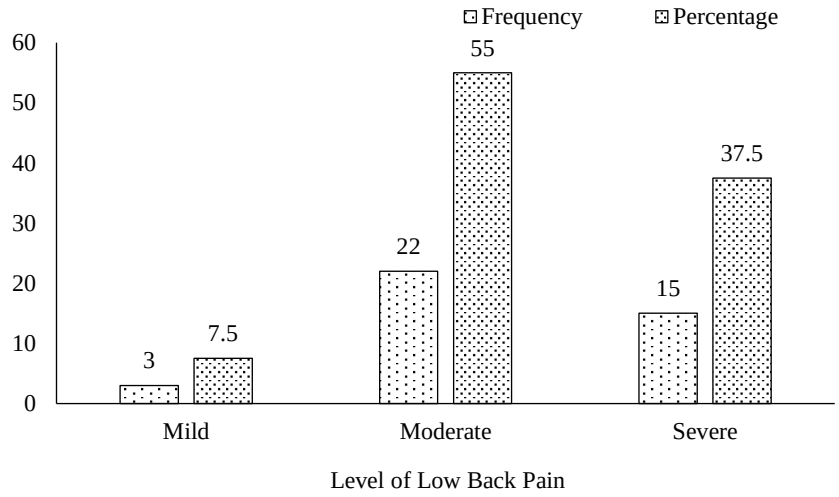

Figure 16. Frequency and percentage distribution of level of LBP among the nursing officers.

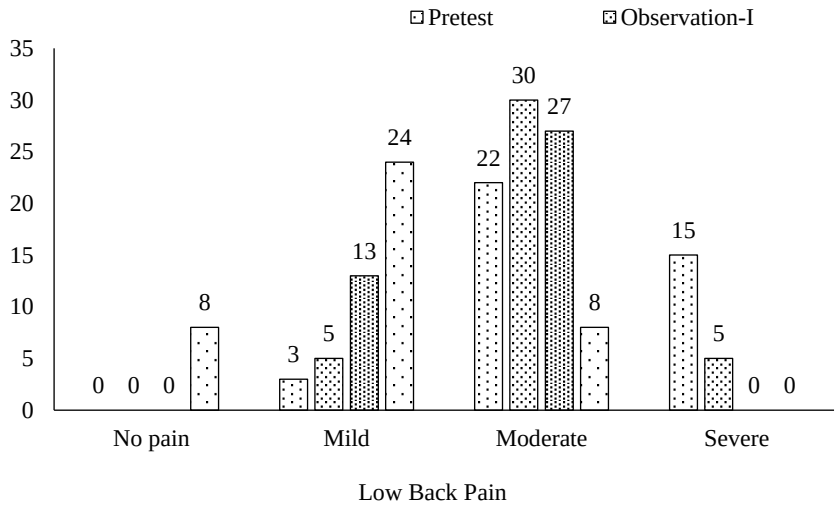

Figure 17. Comparison of pretest LBP among the nursing officers after body mechanism training program.

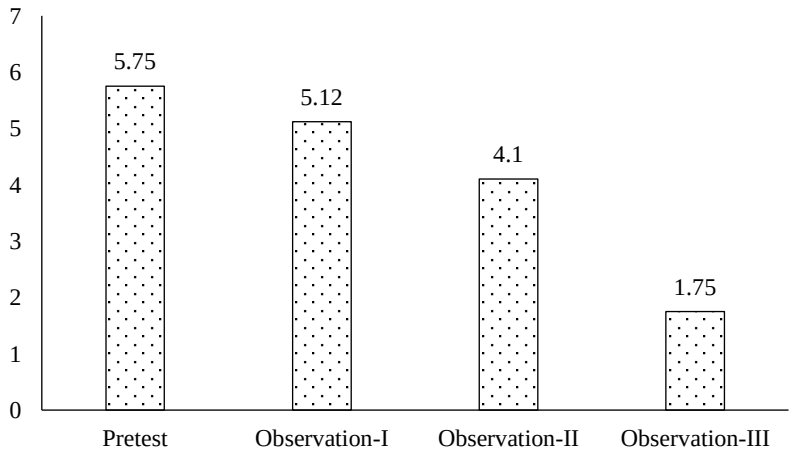

Figure 18. Comparison of mean pretest LBP among the nursing officers after body mechanism training program.

Table 17. Comparison of mean pretest LBP among the nursing officers after body mechanism training program.

S. No.	Duration	Mean ± SD	t-value	p-value	Remark
1	Pretest	5.75±1.49	6.29	<0.0001	S
	Observation-I	5.12±1.30			
2	Pretest	5.75±1.49	14.18	<0.0001	S
	Observation-II	4.10±1.17			
3	Pretest	5.75±1.49	19.1	<0.0001	S
	Observation-III	1.75±1.45			
Total					
P<0.05 Significant level S: Significant					

Table 18. Comparison of repeated measures of LBP among the nursing officers after body mechanism training program.

(I) observation	(J) observation	Mean Difference (I-J)	Std. Error	Sig.(a)	95% Confidence Interval for Difference(a)	
1	2	0.625(*)	0.099	0.000	.349	.901
	3	1.650(*)	0.116	0.000	1.327	1.973
	4	3.775(*)	0.198	0.000	3.225	4.325
2	1	0.625(*)	0.099	0.000	.901	.349
	3	1.025(*)	0.091	0.000	.772	1.278
	4	3.150(*)	0.188	0.000	2.628	3.672
3	1	1.650(*)	0.116	0.000	1.973	1.327
	2	1.025(*)	0.091	0.000	1.278	.772
	4	2.125(*)	0.135	0.000	1.750	2.500
4	1	3.775(*)	0.198	0.000	4.325	3.225
	2	3.150(*)	0.188	0.000	3.672	2.628
	3	2.125(*)	0.135	0.000	2.500	1.750

Table 19. association between LBP scores of nursing officers with selected biophysical variables.

BMI	Pain level			Chi-square	df	P-value	Remark
	Mild	*Moderate*	*Severe*				
Underweight	2	12	7	5.13	6	0.527	NS
Healthy weight	0	3	0				
Overweight	1	6	8				
Obese	0	1	0				
Area of working							
Emergency	1	5	1	7.02	8	0.534	NS
ICU	0	6	5				
SICU	0	3	1				
Medicine ward	1	1	1				
Orthopaedic ward	1	7	7				
Number of liftings/day							
<15	1	0	6	11.64	4	0.02	S
16–30	0	7	4				
>30	2	15	5				
P<0.05 Significant level. NS: Non significant. *S: Significant*							

Tables 18 and 19 revealed that there was no association between low back pain with biophysical variables such as BMI and area of working but it was highly associated with number of patient lifting per day with chi-square value=11.64 and p-value =0.02.

DISCUSSION

This study extensively discusses the study findings, which are interpreted based on the statistical analysis conducted. The findings are discussed in relation to the objectives, need for the study, related literature of the study and conceptual framework. It was in line with objectives of the study, which was conducted to "assess the effectiveness of body mechanics training programme on reducing low back pain among nursing officers working in selected hospitals, Bangalore". To accomplish the objectives, descriptive and inferential statistics were chosen, employing a purposive sampling technique rather than probability sampling.

The study was conducted at the KIMS Hospital and Research Centre in Bangalore. It employed a quasi-experimental design, specifically a one-group pretest-post-test time series, to assess the extent of low back pain (LBP) among a cohort of 40 nursing officers. Purposive sampling methods were utilized to select participants, and data collection involved the use of the defence and veterans pain rating scale. Data analysis, arrangement, and presentation were carried out in accordance with the research aims [37].

DISCUSSION ON FINDING

The results obtained are discussed in different sections as follows:

Section A: To Assess the Level of LBP Among Nursing Officers

The present study was to assess the level of LBP among nursing officers with use of defence and veterans pain rating scale and it was considered to be the most appropriate instrument to elicit the response was no pain (0), mild pain (1–3), moderate pain (4–6), sever pain (7–10) from subjects. This study describes the frequency and percentage distribution of levels of LBP among nursing officers, majority (55%) of nursing officers had moderate LBP, followed by 37.5% of nursing officers had severe LBP and only 7.5% of nursing officers had mild LBP.

This study garnered support from a comparable research endeavour undertaken at Ahmadu Bello University Teaching Hospital (ABUTH) in Zaria, Nigeria. A sample size of 120 was chosen through cluster sampling techniques, and data were collected via self-administered questionnaires. The findings indicated a prevalence of LBP among nurses at 82.7%. The duration of LBP among nurses was highest among those experiencing pain for up to 3 weeks (69.1%), followed by those enduring pain for more than 12 weeks (12.3%). Thus, it is recommended to implement a comprehensive approach to prevent LBP, including initiatives to educate and promote safe handling techniques among nurses at their workplace [28].

This research was reinforced by a comparable study carried out in a typical teaching hospital in Nigeria. A sample size of 112 was chosen using both probability and non-probability sampling techniques, with data collected through self-structured knowledge questionnaires. The results revealed that more than 40% of the participants possessed work experience ranging from 6 to 10 years. Additionally, more than half reported experiencing LBP weekly, while over 60% requested leave monthly due to workplace stress and LBP. The study concluded that there is a necessity to provide perioperative nurses with training in body mechanics by occupational health nurses and other relevant stakeholders to mitigate the occurrence of practices that may contribute to LBP [29].

Section B: To Assess the Effectiveness of Body Mechanics Programme on Reducing LBP Among Nursing Officers

Frequency and percentage distribution of nursing officers based on effectiveness of body mechanics programme on reducing LBP.

In this study, the nursing officers meeting the inclusion criteria were given a defence and veterans pain rating scale to assess the level of LBP.

- *Pretest: The* findings show that the majority (55%) of nursing officers had moderate LBP followed by 37.5% of nursing officers had severe LBP and only 7.5% of nursing officers had mild LBP.
- *Post-test:* The finding shows that after a body mechanics training programme here observed that the level of LBP slowly reduced during observation-I, observation-II, and observation-III.

The present study revealed a comparison of mean pretest LBP among nursing officers after a body mechanics training programme. It showed that body mechanics training programme was effective in reducing LBP score significantly with p-values less than 0.0001. Hence body mechanics training programme can reduce LBP significantly.

This study received reinforcement from a comparable study conducted in a tertiary care hospital in Bhubaneswar, Odisha (PBMH, KIMS). The samples (n=60) were selected using purposive and convenience sampling techniques and the data were collected by using self-structured knowledge questionnaires. The results revealed that was findings interpreted that in orthopaedic ward, out of 20 nurses, 45% have good knowledge, 5% have average knowledge and 50% have poor knowledge on prevention of LBP; in surgery ward, out of 20 nurses, 60% have good knowledge, 25% have average knowledge, and 15% have poor knowledge on prevention of LBP; and in medicine ward, out of 20 nurses, 70% have good knowledge, and 30% have average knowledge on prevention of LBP. The study results indicated that the self-instructional module successfully enhanced the knowledge of nurses [25].

This research was reinforced by a similar study conducted in a chosen nursing college within Mangalore taluk. A sample size of 60 was selected through simple random sampling techniques, and structured knowledge questionnaires were utilized for data collection. The outcomes indicated a notable increase in mean percentage scores from pretest (49.33%) to post-test (83.89%). The findings underscored a significant disparity between the mean pretest and post-test scores regarding knowledge of body mechanics among nursing students, affirming the efficacy of the planned teaching program [36].

Section C: To Find Out Association Between LBP Scores of Nursing Officers with Selected Biophysical Variables

Frequency and percentage distribution of nursing officers categorized by the variance between LBP scores and chosen biophysical factors. The biophysical variables are such as height and weight (BMI), area of working, number lifting of patients, duration of working, nurses-patient ratio and health condition. The study findings that there was no significant association between BMI, area of working, duration of working, nurses-patient ratio and health condition but it was highly associated with number of patients lifting per day with chi-square value=11.64 and p-value=0.02.

This study was supported by a similar study conducted in a tertiary care hospital in south India. The samples (n=84) were selected randomly and the data were collected by using backache assessment questionnaires and assessing the severity by Oswestry Disability Index (ODI). The results revealed that prevalence of LBP among nurses was 73.8%, however 83.3% among these have minimum disability as per ODI. The study concluded that nurses in night shifts with overtime duty had a higher incidence of LBP, among nurses working in different wards, medicine, orthopaedics and ICU had higher prevalence of LBP [25].

This study received backing from a comparable investigation carried out at Christian Medical College, Vellore, South India. The sample size comprised 1284 participants chosen through a combination of probability and non-probability sampling techniques, and data collection relied on self-administered questionnaires. The findings indicated that 53.4% of the nurses experienced LBP, with 17.1% classified as high-risk individuals. A notable correlation ($p<0.001$) was observed between LBP

and factors such as age, body mass index, work experience, and workplace setting. The study concluded that regular education on proper body postures, physical fitness, and effective body mechanics could aid in preventing LBP among nurses.

Furthermore, this study was supported by a similar investigation conducted at Riyadh Hospital. A cluster sampling technique was utilized to select 352 participants, and data were gathered using questionnaires and the Oswestry Disability Index. The findings unveiled a prevalence of 79% for LBP within this sample, with most nurses exhibiting moderate to severe disability scores. The study concluded by recommending the development of a comprehensive education program on effective body mechanics to assess its effectiveness among nurses [12].

Section D: Discussion related to hypothesis

Frequency and percentage distribution of nursing officers according to the proposed hypotheses.

- *H_1:* The study suggests that there could be a notable enhancement in the average post-test pain score in comparison to the average pretest pain score among nursing officers. The research hypothesis H1 posited in the study is upheld, signifying a significant advancement in the mean post-test pain score compared to the mean pretest pain score among nursing officers, at a significance level of $P<0.001$. Hence, hypothesis H_1 is accepted as there was a significant improvement in mean post-test pain score of nursing officers after body mechanics training programme.
- *H_2:* There might be a notable correlation between LBP and chosen biophysical factors among nursing officers.

The investigator accepted the hypotheses H_2 since there was statistically significant association between LBP scores with selected biophysical variables like BMI, Area of working, nurses-patient ratio, duration of work and health condition but it was highly associated with number of patient lifting per day with chi-square value=11.64 and p-value =0.02 [37–40].

CONCLUSION

This study provides the outcomes, implications, constraints, and recommendations derived from the research titled "An investigation into the effectiveness of a body mechanics training program in reducing low back pain among nursing officers at selected hospitals in Bangalore." Utilizing a Defence and Veterans Pain Rating Scale, data collection was conducted. To meet the research objectives, descriptive and inferential statistics were employed, utilizing a non-probability purposive sampling technique.

The study took place at KIMS Hospital and Research Centre in Bangalore. Employing a quasi-experimental one-group pretest-post-test design and a quantitative methodology, data were gathered from 40 nursing officers through purposive sampling. The study's conclusions were based on its findings:

1. The overall percentage of the pre-test level of LBP score among nursing officers revealed that the majority (55%) of nursing officers had moderate LBP followed by 37.5% of nursing officers had severe LBP and only 7.5% of nursing officers had mild LBP.
2. Comparison of pretest LBP among the nursing officers after body mechanics training programme here observed that the level of LBP slowly reduced during observation-I, II, and III. Comparison of mean pretest LBP among nursing officers after body mechanics training programme it showed that body mechanics training programme was effective in reducing LBP score significantly with p-values <0.0001. Hence body mechanics training programmes can reduce LBP significantly.
3. It was analysed in this study that there was no significant association between LBP with biophysical variables such as BMI, area of working, nurse-patient ratio, duration of work and health condition but it was highly associated with number of patient lifting per day with chi-square value=11.64 and p-value=0.02.

IMPLICATIONS

The study's discoveries have various implications across multiple domains, specifically within nursing practice, nursing administration, nursing education, and nursing research.

Nursing Practice

"Prevention is better than cure," so nursing officers practice and follow body mechanics techniques to prevent or reduce the level of LBP. The findings of the study clearly enlighten the fact that body mechanics techniques were reduced on LBP among nursing offices at Bangalore and helped them to lead a healthy life. It helps the nursing officers to provide good quality care to patients. It aids in conserving time and effort, simplifying tasks, and alleviating discomfort. When working, following proper body alignment and posture can help prevent musculoskeletal injuries and deformities. Good posture promotes the physiological function of the body.

Nursing Education

Nursing education plays an important role in preparing the nurses for providing Well-being to the people in various areas. Nurses should have a good practice of body mechanics to prevent LBP and it is a very common and serious condition for nursing officers. This study's implications extend to the realm of nursing education, highlighting the necessity for regular in-service training to promote the adoption of body mechanics techniques for reducing LBP. This can be facilitated through the dissemination of publications and the organization of journal clubs, workshops, seminars, and conferences, all of which contribute to learning about preventative strategies for LBP.

Nursing Administration

Effective nursing administration plays a crucial role in overseeing and managing the nursing profession. This study offers various implications for nursing administration. Nurse administrators should proactively develop strategies and policies for ongoing education programs. They should also organize in-service education and continuing nursing education opportunities to ensure that nurses can continually update their knowledge and skills.

Nursing Research

The research will serve as a valuable resource and guide for future investigators. Its outcomes will contribute to the expansion of the scientific knowledge base in the professional field, providing a foundation upon which additional research endeavours can be built. Research should be focused on body mechanics programme using various methods and techniques in reducing LBP. The nurse researchers can conduct workshops, seminars sessions to communicate the research findings to the nursing professional.

LIMITATIONS

- The study is limited to nursing officers working in KIMS Hospital.
- Nursing officers who are willing to participate in the study.
- Nursing officers who are available at the time of data collection.
- Assess the effectiveness of Body mechanics training program on reducing LBP.
- The sample for the study was limited to 40 nursing officers.
- It was difficult to gather all the nursing officers together for training programme.

RECOMMENDATIONS

Based on the study findings, the following recommendations are proposed for future research:

- Explore knowledge, attitudes, and practices in a study with an expanded sample size to enhance generalizability. Employing a video-assisted method could be beneficial.
- Conduct an experimental investigation involving a control group for a more effective comparison of outcomes.
- Compare nurses' experiences across government and private hospital settings in a comparative study.
- Include additional demographic and biophysical variables in future research endeavours.

REFERENCES

1. Nutan Makasare, Seema Singh. Effect of body mechanics, physical exercise, and yoga on management of LBP among women working in nursing professions. Int J Curr Res. 2021; 13(1): 15715–15717.
2. Khorsandi M (PhD), Sharafkhani N (MSc), Shamsi M (PhD), Ranjbaran M (MSc). Knowledge, self-efficacy, and practice among nurses for prevention of chronic LBP in Arak, Iran. JOHE Autumn. 2013; 2(4): 157–165.
3. Rabins Kumar Sah, Shrooti Shah, Dipika Karn, Gaurav Gupta. Factors associated with LBP among nursing personnel at national medical college and teaching hospital Birganj, Nepal. Int J Health Sci Res. 2022; 12(4): 27–32.
4. Jose Pradap. Effectiveness of planned teaching programme on knowledge regarding body mechanics among nursing students in selected nursing college of Mangalore taluk. Asian J Nurs Educ Res. 2015; 5(2): 217–220.
5. Reda AbdEslamIbragim, Elassy Om Ebrahiem AE. The effectiveness of the body mechanics training program of intensive care nurses in reducing LBP. IOSR J Nurs Health Sci (IOSR-JNHS). 2015; 5(5): 81–96.
6. Nini Asfaw Negash, Azmeraw Tadele, Abebaw Jember Ferede. Prevalence and Associated Factors of LBP among healthcare professionals at university of Gondar Comprehensive and specialized hospital, Northwest Ethiopia. J Pain Res. 2022; 15(2): 1543–1552.
7. Olufemi Oyebanji Oyediran, Samuel Oladele Adeyemi, Kolawole Damilare Ogundeji, Israel Opeyemi Fawole, *et al*. Predictors of LBP among perioperative nurses in a typical Nigeria teaching hospital. Chron Pain Manag. 2022; 6(1): 140.
8. Gowri Sayee Jagadesan, Mala VS. Stop on knowledge regarding Body mechanics and selected nursing procedures and prevention of back pain among staff nurses in Fortis hospital. Indian J Surg Nurs. 2020; 9(2): 57–65.
9. Ayele Semachew Kasa, Yinager Workinen, Emiru Ayalew, Worku Animaw Temesgen. LBP among nurses working in the clinical setting of Africa: systematic review and meta-analysis of 19 years of studies. BMC Musculoskelet Disord. 2020; 21(1): 310–313.
10. Nirmala M Emmanuel, Punitha Ezhilarasu, Anu Bharathy Bheemarao. LBP among nurses in a Tertiary hospital, South India. J Osteopor Phys Act: Open Access Journal. 2015; 3(4): 161.
11. Seyed Ehsan Samaei, Maryam Mostafaee, Hasanali Jafarpoor, Majid Bagheri Hosseinabadi. Effects of patient-handling and individual factors on the prevalence of low back pain among nursing personnel. Work. 2017; 56(4): 551–561.
12. Ozlem Ovayolu, Nimet Ovayolu, Mehtop Genc, Nilgun Col-Araz. Frequency and severity of low back pain in nurses working in intensive care units and influential factors. Pak J Med Sci. 2014; 30(1): 70–76. Available from: http://dx.doi.org/10.12669/pjms.301.3455
13. Tesfaye Hambisa Mekonnen. Work-related factors associated with low back pain among nurse professionals in east and west Wollega zones, Western Ethiopia. Pain Ther. 2019; 8(2): 239–247. Available from: http://dx.doi.org/10.6084/m9.figshare.8242583.
14. Wided Boughattas, Olfa Ei Maalel, Maher Maua, Iheb Bougmiza, Houda Kalboussi, *et al*. Low back pain among nurses: prevalence, and occupational risk factors. Occup Dis Environ Med. 2017; 5(1): 26–37. Available from: http://www.scirp.org/10.4236/odem.2017.51003.
15. Barbara Garrett (EdD RN), Deborah Singiser (MEd, RN), Banks Stephen M (PhD). Back injuries among nursing personnel. AAOHN Journal. 1992; 40(11): 510–516.
16. Sandhya RV, Kumari MJ, Gopisankar, Angeline Mary Sheela. Prevalence of back pain knowledge on body mechanics among the staff nurses in a tertiary care hospital. Int J Adv Res. 2015; 3(9): 928–934.
17. Aziz Karahan (RN, PhD), Nurdan Bayraktar (PhD, RN). Effectiveness of an education program to prevent nurses' low back pain. Workplace Health Saf. 2013; 61(2): 143–152.
18. Maria Olalla, Gladys Naranjo, Silvana Lopez, Maura Munoz, Favian Bayas-Morjon. Body mechanics and complications in the nursing personnel of the emergency service of luis vernaza general hospital. Electron J Gen Med. 2020; 17(2): 192–198.
19. Adel Alshahrani. Prevalence of low back pain among nursing staff in Najran, Saudi Arabia. Med Sci. 2020; 8(45): 136–140. Available from: https://www.10.3390/medsci8040045.

20. Gopi Contractor. Knowledge and practice of body mechanics techniques among the nurses. Int J Sci Res. 2019; 8(7): 265–273.
21. Mehdi Pakbaz, Mohammad Ali Hosseini, Seyedeh Zahra Aemmi, Sepideh Gholami. Effectiveness of the back school program on the low back pain and functional disability of Iranian nurses. J Exerc Rehabil. 2019 Feb 25; 15(1): 134–138. Available form: http://doi.org/10.12965/jer.figshare.183 6542.271
22. Jayakrishna K. Knowledge and practice among staff nurses regarding body mechanics in IMS and SUM hospital. International Journal of Advances in Nursing Management (IJANM). 2016; 4(3): 259–263.
23. Jose Pradap. Effectiveness of planned teaching programme on knowledge regarding body mechanics among nursing students in selected nursing college of Mangalore taluk. Asian J Nurs Educ and Research. 2015; 5(2): 217–220.
24. Aditi Rawat, Arti Negi, Manish Gusain, Neetu Negi, Nisha Tomar, *et al*. Knowledge Assessment On use of body mechanics and safety measures among ward attendants in selected hospitals of Dehradun, Uttarakhand. International Journal of Advances in Nursing Management (IJANM). 2017; 5(4): 288–292.
25. Chan Siok Gim. Factors associated with LBP among nurses in critical care units, hospital Universiti Sains Malaysia. Biomed J Sci Tech Res. 2017; 1(7): 2025–2030.
26. Fatimah Altheyab, Hessa Almutain, Sarah Alotaibi. Impact of back pain on daily living activities among nurses in Riyadh region. SSRG Int J Nurs Health Sci. 2020; 6(3): 26–31.
27. Kulumina Dash, Minatia Das. A study to assess the effectiveness of self-instructional modules regarding knowledge of correct body mechanics in prevention of LBP among staff nurses working at tertiary care hospital, Bhubaneswar, Odisha. Int J Nurs Educ Res. 2019; 11(2): 1231–1235.
28. Priyanka Masih, Tarun Kumar. A study to assess the effectiveness of a self instructional module on the knowledge regarding proper body mechanics among the critical care nurses in selected hospitals of Moradabad. Int J Sci Res. 2020; 9(6): 1541–1544.
29. Nair Rahul S, Janardhana Aithala P. Prevalence and risk factors associated with LBP among nurses in a tertiary care hospital in South India. Int J Orthop Sci. 2020; 6(1): 301–306.
30. Muhammed Awwal Farooq, Ladan Muhammad Awwal, Halima Abdual Musa, Garba Abdullahi Mustapha. Work-related risk factors for LBP among nurses in Ahmadu Bello University Teaching Hospital(ABUTH), Zaria- Nigeria. IOSR J Nurs Health Sci. 2015; 3(4): 20–25.
31. Bareza Rezaei, Elahe Mousavi, Bahram Heshmati, Shaphagh Asadi. LBP and its related risk factors in health care providers at hospitals. Ann Med Surg. 2021; 5(3): 335–342.
32. Gelana Fekadu Mijena, Biftu Geda, Merga Dheresa, Sagni Girma Fage. LBP among nurses working at public hospitals in Eastern Ethiopia. J Pain Res. 2020; 13: 1349–1357.
33. Azize Karahan (R N PhD), Nurhan Bayraktar (R N PhD. Effectiveness of an education programme to prevent LBP among nurses. Workplace Health Saf. 2013; 61(2): 73–78.
34. Aman Dev Singh, Ritu Rochwani, Ishan Sagar, Riya. Awareness regarding risk factors of LBP among medical students in Punjab. Int J Community Med Public Health. 2019; 6(10): 4407–4411.
35. Wael Abdullah Al Johani, Glezzeelyne Pascual Pascua. Impacts of manual handling training and lifting devices on risks of back pain among nurses. Nurse Media: J Nurs. 2019; 9(2): 210–230.
36. Aishah Almaghrabi, Fatmah Alsharif. Prevalence of LBP and associated risk factors among nurses at King Abdulaziz University Hospital. Int J Environ Res Public Health. 2021; 18(4): 1567–1572.
37. Brunner LS, Suddarth DS, Smeltzer SCO. Brunner & Suddarth's Textbook of Medical-Surgical Nursing. 11th ed. Philadelphia: Lippincott Williams & Wilkins; 2008.
38. Javed Ansari, Davinder Kaur. A textbook of Medical Surgical Nursing. 2021 Edn. Vol. I&II. India: PV; 2021; 784–796, 1554–1572.
39. Priscilla LeMone, Karen Burke. Medical Surgical Nursing critical thinking in client care. 4th Edn. Vol. I. Pearson/Prentice Hall; 2008; 785–800.
40. Nancy Sr. Principles and practice of nursing. 6th Edn. Vol. I. Indore: NR publishing; 2014; 343–354.

