

Research Paper

The Impact of Age and Gender on Recovery and Rehabilitation of Surgical Patients

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ABSTRACT

Recovery and rehabilitation are crucial aspects of patient care. Influencing long term health outcomes and quality of life. Two remarkable factors that can impact recovery and rehabilitation are age and gender. Age can affect rehabilitation and recovery due to physiological changes, comorbidities, physical and cognitive reserve etc. and gender can affect health seeking behavior, treatment adherence, symptom reporting and pain tolerance. Also, women and men may experience different recovery approaches and rehabilitation outcome due to biological, physiological and social factors. The study utilizes mixed method design assessing patients across various age group and gender to identify differences in recovery time, rehabilitation progress and overall outcome. Data was collected through medical records, patient survey and rehabilitation assessment. The study investigates the effects of age and gender on recovery and rehabilitation in patients undergoing surgery or receiving medical treatment. By exploring these factors, we can identify opportunities to optimize patient care, improve outcome and reduce healthcare disparities. The study highlights the need for age and gender sensitive approaches in patient care and rehabilitation strategies to optimize recovery and improve patient outcome.

Keywords: *Age and Gender, Recovery and Rehabilitation, Surgical Patients*

The interplay between age, gender, and surgical recovery is a critical area of research in the field of perioperative medicine. As the global population ages and the complexity of surgical interventions increases, understanding how demographic factors influence recovery and rehabilitation outcomes is vital for optimizing patient care. Age and gender are two fundamental variables that can significantly affect surgical outcomes, influencing both the recovery trajectory and rehabilitation process.

Age is a key determinant of recovery dynamics. Older adults often face unique challenges post-surgery, including reduced physiological resilience, slower metabolic processes, and a higher prevalence of chronic comorbidities. These factors can lead to prolonged recovery times, increased risk of postoperative complications, and a need for more intensive rehabilitation efforts. Conversely, younger patients generally benefit from faster healing and fewer health complications, though individual variability remains significant.

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Gender also plays a crucial role in shaping recovery outcomes. Biological differences, such as hormonal variations between males and females, can impact pain perception, inflammation, and tissue healing. Additionally, gender-specific social and behavioral factors, such as differences in health-seeking behaviors and adherence to rehabilitation protocols, further complicate recovery patterns.

This research aims to investigate the independent and interactive effects of age and gender on surgical recovery and rehabilitation outcomes. By analyzing these factors, the study seeks to inform customized postoperative care strategies that meet the unique needs of diverse patient populations, ultimately enhancing recovery trajectories and quality of life for surgical patients.

LITERATURE REVIEW

1 Surgical interventions are critical for managing various health conditions, but the recovery process can vary significantly among patients. Age and gender are two demographic factors that have been extensively studied to understand their impact on rehabilitation outcomes. This literature review aims to synthesize current research on how age and gender influence the rehabilitation and recovery of surgical patients.

(I) Age and Surgical Recovery:

Physiological factors are seen as Older adults often face comorbidities, such as cardiovascular disease and diabetes, which can complicate recovery. Research indicates that age-related physiological changes, such as decreased muscle mass and reduced metabolic rate, can hinder rehabilitation efforts.

Cognitive and Psychological Factors can affect Older patients as they may experience cognitive decline, which can affect their ability to follow rehabilitation protocols. Studies have shown that older adults are more likely to experience depression and anxiety post-surgery, influencing their participation in rehabilitation.

It can be seen that older adults may experience longer recovery times and lower functional outcomes compared to younger patients. as many physiological factors can take part in recovery and rehabilitation process. Also older patients have a higher incidents of complications including surgical site infections and cardiopulmonary events. Furthermore, the struggle to get functional independence post-surgery might be related to the factors like lack of physical strength/weakness and pre-existing disabilities, leading to prolonged dependency on assistive services.

(II) Gender and Surgical Recovery

Gender differences in pain perception and reporting are well documented. Women often report higher pain levels after surgery and may require more intensive pain management strategies. Many research highlighted that women experience a greater incidence of chronic pain post operatively compared to men.

Biological differences can impact recovery very much. For example, hormonal differences may affect pain perception and healing rates. Women often report higher pain levels post-surgery compared to men, which can influence their rehabilitation progress.

Gender roles also affect recovery. Women are more likely to have caregiving responsibilities, which can impede their ability to focus on recovery. And also, they may

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have strong social support networks, which can positively influence recovery outcomes. Conversely, men may exhibit a tendency to downplay their pain or discomfort, potentially leading to underreported issues during rehabilitation.

Surgical outcomes also differs according to gender. Research indicates that women may experience different postoperative complications than men. Many studies shows that women had higher rates of complications in certain surgical procedures like total hip arthroplasty and total knee arthroplasty, where they experienced lower functional outcomes compared to men. On the contrary men often recover more quickly from certain surgeries, possibly due to differences in muscle mass, body composition, bone structure etc.

(III) Combined Effects of Age and Gender

The intersection of age and gender can create complex challenges in recovery. Older women, for instance, face unique risks related to both age-related comorbidities and gender-specific complications. Also older women also need special prolonged and complex rehabilitation needs. A study by Martin et al. (2023) highlighted that older female patients have a significantly higher risk of delayed recovery compared to their male counterparts.

(IV) Tailored Rehabilitation Programs: Understanding the combined effects of age and gender can lead to more tailored rehabilitation strategies. Programs that consider these factors can enhance recovery by addressing specific needs. For instance, individualized pain management strategies may be particularly beneficial for older women recovering from surgery.

The literature indicates that both age and gender significantly impact surgical recovery and rehabilitation. Older patients generally face longer recovery times and higher complication rates. While gender differences in pain perception and recovery experiences further complicate post-operative outcomes. Researches should continue to explore these dynamics and advocate for tailored rehabilitation approaches that addresses the specific needs for diverse patient populations.

2 A prospective, multicenter cohort of 11,602 unilateral primary TKA patients (7,284 females and 4,318 males) was prospectively evaluated. Prior surgery female patients reported worsened pain, function and quality of life (QoL) Than male patients. after 5 year of TKR surgery women again complained of worsened pain. Quality of life and function than man.

These differences are very small and clinical.

There are no significant gender differences in pain, function, or quality of life five years after total knee arthroplasty (TKA). While women often have worse symptoms before surgery, they tend to improve more than men and achieve similar outcomes in pain, function, and quality of life. This information can help female patients and surgeons make better decisions together and set realistic expectations before TKA.

There are no significant gender differences in pain, function, or QoL five years after TKA. Although women start with worse symptoms, they tend to improve more than men and ultimately have similar outcomes. This information can help patients and surgeons set realistic expectations before surgery.

(David C. Ayers MD. et al. 2023)

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3 According to previous studies differences may exist between men and women in terms of knee function before and after total knee replacement. This may be related to the efficacy of the procedure itself or to differences in the severity of disability of male and female patients at the time of surgery. In this research there were 698 patients who underwent elective TKA between 1996 and 2007. This population consisted of 428 women (61%) and 270 men (39%).

The men in the study were, on average, three years younger than the women (63.5 years vs. 66.6 years). Both groups had similar range of motion (ROM) before and after surgery, as well as changes in ROM and body mass index. Preoperative Knee Society scores were comparable (men: 47.4; women: 46.7), but men scored four points higher at follow-up (89.2 vs. 85.2). Women had lower Knee Function scores than men both before (45.2 vs. 57.1) and after surgery (65.3 vs. 73.9).

Women undergoing TKA tend to seek treatment later than men and experience more functional disability at the time of surgery. These differences in functional scores continue even after the procedure. So it can be seen that starting treatment earlier might improve outcomes after surgery. And having surgery at the early stage of erosion and less age might make a difference in recovery and rehabilitation process for women. Also cultural norms may lead women to downplay their recovery needs, focusing on caregiving roles rather than personal health. Women may have additional responsibilities at home, making it challenging to prioritize their recovery. Balancing recovery with family obligations can lead to delays in rehabilitation. Women may sometimes receive less intensive rehabilitation compared to men, possibly due to assumptions about their pain tolerance and recovery capacity. So it becomes important to make a rehabilitation program that considers individual needs and differences.

4 Factors related to gender may explain differences in biomechanics and functional outcomes for patients undergoing total hip arthroplasty (THA).

In a study by Holtzman et al. involving 1,120 patients over 65 (61.4% female), it was found that men walked longer distances and experienced less severe pain during walking compared to women both at the time of surgery and one year later. Women continued to report shorter walking distances and needed more assistance with daily activities like walking, housework, and shopping.

A separate study from the Dutch joint registry identified three patient groups based on recovery speed, with women often classified as "slow starters."

Additional research by Patel et al. analyzed 418,885 patients who underwent elective THAs and TKAs and revealed that women generally had higher body mass indexes (BMIs), were older, and needed more preoperative assistance. Men had higher rates of certain comorbidities like hypertension and diabetes, but women were found to be at greater risk for complications such as wound infections and longer hospital stays.

Moreover, literature reviews indicate that women, especially older women receiving cementless implants, face higher risks of periprosthetic fractures and revisions. Studies show that female patients significantly increase the risk of intraoperative fractures, which can lead to higher rates of revision surgeries and even increased mortality within 90 days post-surgery.

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These findings highlight the importance of considering gender and age when planning THA procedures.

Parsley, Brian S. MD. Et al (2010)

RESEARCH METHODOLOGY

The object of this research is to evaluate the impact of age and gender of patients on their recovery and rehabilitation. This is to also help to assess differences in pain management effectiveness between male and female patients, as well as to evaluate the role of age in the recovery timeline and rehabilitation outcomes. It also helped to gather qualitative insights on patient experiences during recovery, focusing on the factors that influence rehabilitation success.

The study was conducted in mixed method pattern, combining quantitative and qualitative approaches to provide a comprehensive understanding of recovery outcomes. The data collection occurred within 1-month post-surgery. Adults aged 30 and older who had undergone surgical procedure were taken as participants. Patients who had advanced cardiovascular diseases and uncontrolled diabetes or conditions that could impact recovery were excluded.

Simple random sampling technique was used to ensure an equal distribution of gender and representation across different age groups. A total of 50 participants were taken, with 25 males and 25 females. The data was collected through indirect method. Quantitative data collection was done by google forms. The form contained 24 questions inclusive of 4 demographic questions, 17 close ended questions and 4 irrelevant and/or open-ended questions. The form contained questions to get demographic data such as age, gender, type of surgery, pre-existing health conditions or surgeries in past, also recovery metrics such as pain level measurement using a numerical rating scale, pain management techniques used by the patient etc. and open ended questions were also asked in google form to capture personal recovery experiences, perceived barriers and facilitators to rehabilitation, and suggestions for improvement in post-surgical care. Comparative analysis is performed to examine the difference between male and female participants, as well as among different age groups.

RESULT DISCUSSION

The aim of this study was to investigate how the age and gender of surgical patients impact their recovery and rehabilitation. This study focuses on several factors, such as pain tolerance, the duration of pre-surgery pain, quality of life before surgery, pain management techniques, physiotherapy/exercise usage, and stress levels.

The study included an equal number of male and female participants, with a total of 50 patients (25 male and 25 female). These patients were grouped into three age ranges: 20-40, 41-60, and 61-80. The distribution showed that:

Younger participants (20-40 years): 3 males and no females were in this age group. Middle-aged participants (41-60 years): 9 males and 11 females. Older participants (61-80 years): 13 males and 14 females. A higher number of patients especially females fall in the older age group (61-80 years). This may suggest that older individuals, particularly women, are more likely to require surgery, possibly due to age-related health conditions or slower recovery from injuries.

The pain tolerance score was measured on a scale where Female patients had higher scores in terms of experiencing pain, suggesting they may report or feel pain more acutely than

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their male counterparts. This could be due to biological differences in pain perception or social factors that influence how pain is reported and managed.

The data for how long patients were suffering from pain before surgery showed a significant difference. For females: 4 had pain for 1-2 years, 7 for 2-4 years, and 14 for more than 4 years. For males: 12 had pain for 1-2 years, 9 for 2-4 years, and only 4 had pain for more than 4 years. This shows that a larger proportion of females suffered from pain for more than 4 years before undergoing surgery, while most males reported suffering for a shorter duration (1-2 years). This indicates that women may delay surgery or endure chronic pain longer than men before seeking surgical intervention.

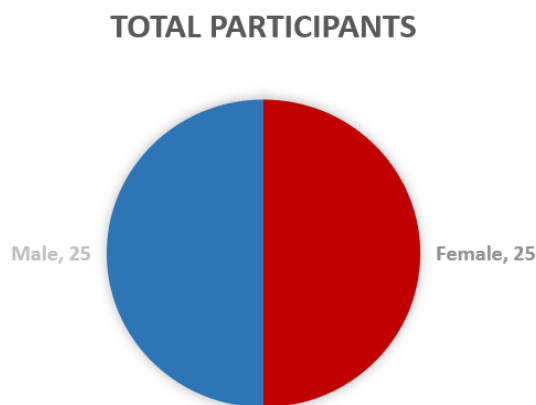
Furthermore, Patients were asked about their quality of life before surgery, categorized as Irrelevant, Painful, or Regular. Most females (22 out of 25) reported having a painful life before surgery, while only 3 had a regular life. In contrast, 21 males reported a regular life before surgery, and only 2 found it painful. It is seen in this that the majority of female patients experienced significantly more disruption in their daily lives due to pain before surgery compared to male patients. This difference might be due to a combination of biological, psychological, or social factors, including the underreporting of pain by men or a higher pain threshold among them.

In terms of pain management before surgery 5 males and 5 females used some form of pain management. More females (9) reported using pain management techniques like physiotherapy or exercise than males (4). Females were more likely to try different methods to manage their pain before opting for surgery, perhaps indicating a greater willingness to explore non-invasive treatments before turning to surgical options.

When asked if they had tried physiotherapy or exercise to manage their pain. 12 males had not, while 8 males had tried physiotherapy. 14 females had not, while 11 females had tried physiotherapy. Although more females reported trying physiotherapy or exercises, a significant number of both males and females did not attempt these methods. This highlights the potential using conservative treatments before opting for surgery.

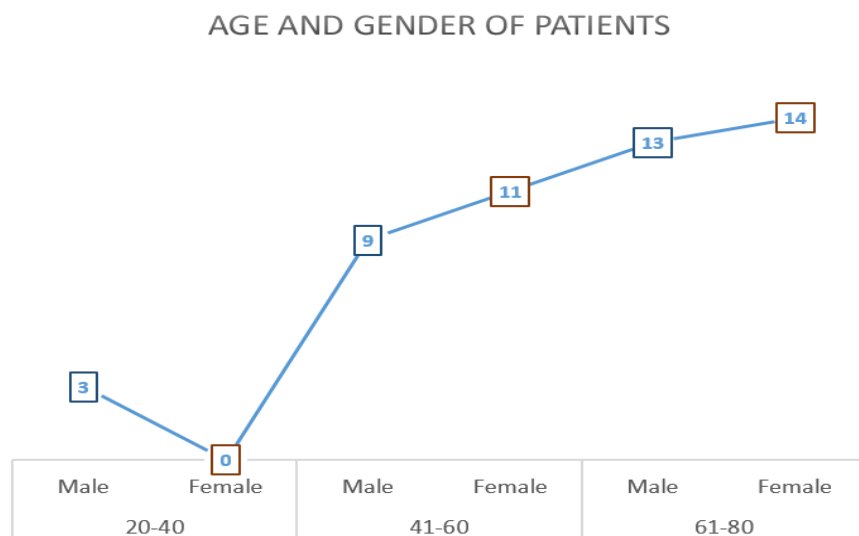
Stress levels were broken down into 5 categories, with both genders showing relatively similar patterns. Stress Level 1 (Low Stress): 12 males and 12 females. Stress Level 2: 8 females and 6 males. Higher stress levels (3-5): A small proportion of both genders experienced higher stress, with slightly more males reporting levels 3 and 4. Most patients, regardless of gender, reported low to moderate stress levels. However, there seems to be a slight difference in how males and females manage stress, with more males reporting moderate to high stress. This might reflect different coping mechanisms or the fact that females may have learned to manage stress better due to the longer duration of pain they experience.

Figure 1



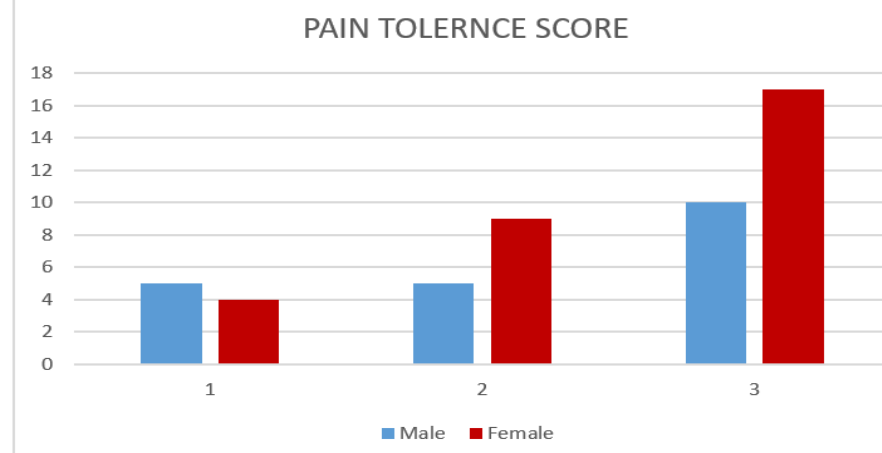
Note: this graph demonstrates total participants and gender of participants.

Figure 2



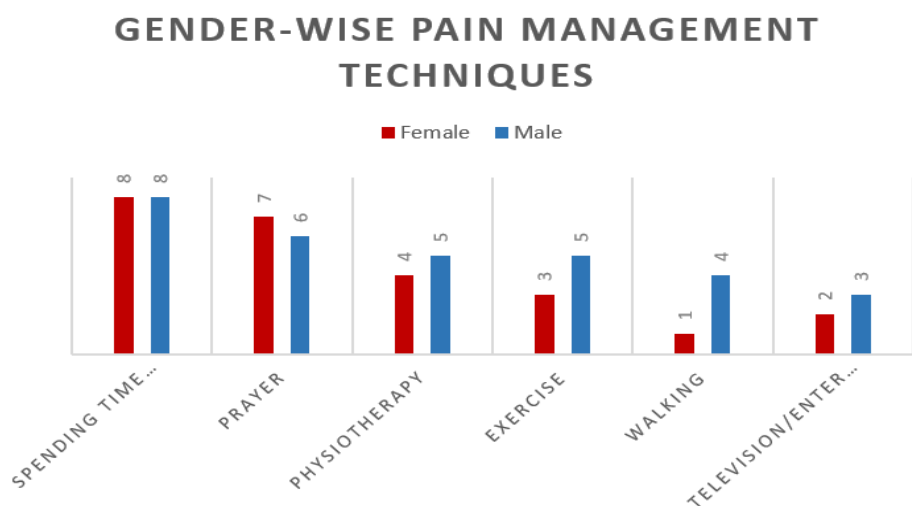
Note: this graph shows age-range and gender of participants.

Figure 3



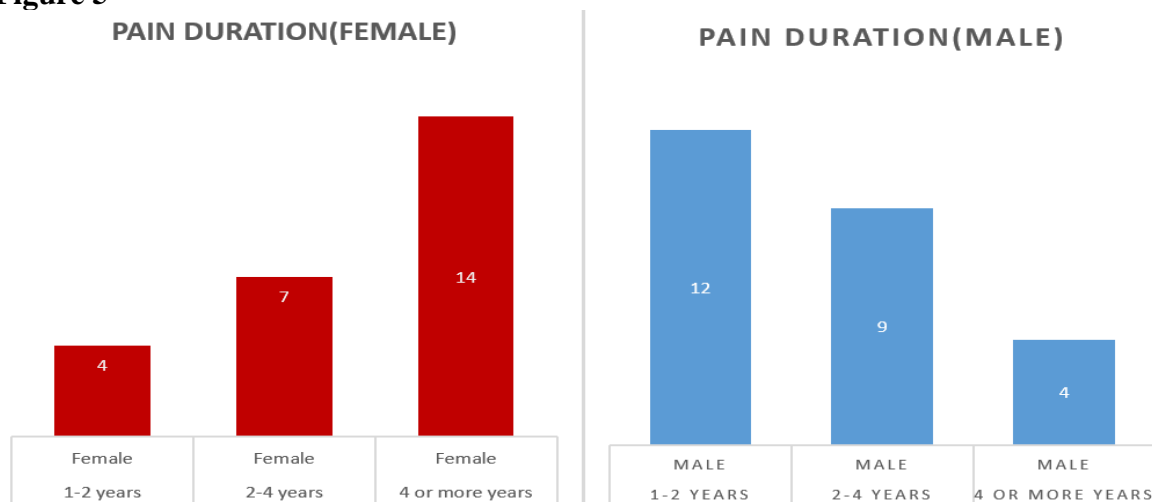
Note: this graph shows pain level of participants according to gender. 3 pain tolerance levels, 1 being low and 3 being high.

Figure 4



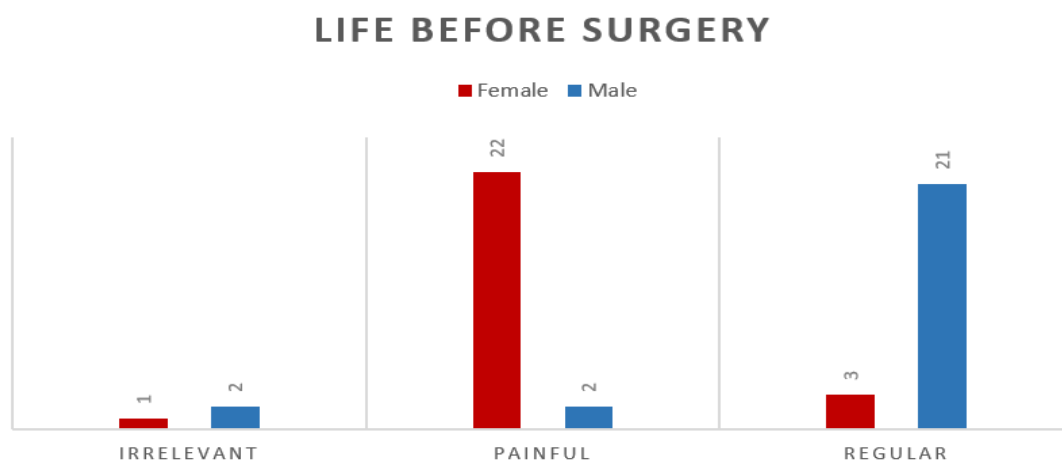
Note: this graph shows various pain management techniques used by participants according to gender.

Figure 5



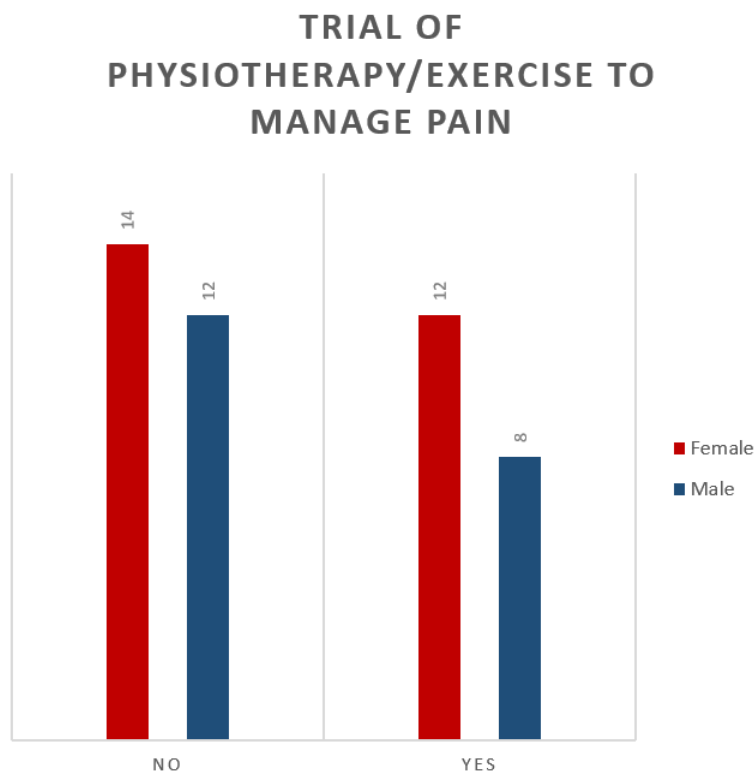
Note: this graph shows the duration of pain participants were suffering.

Figure 6



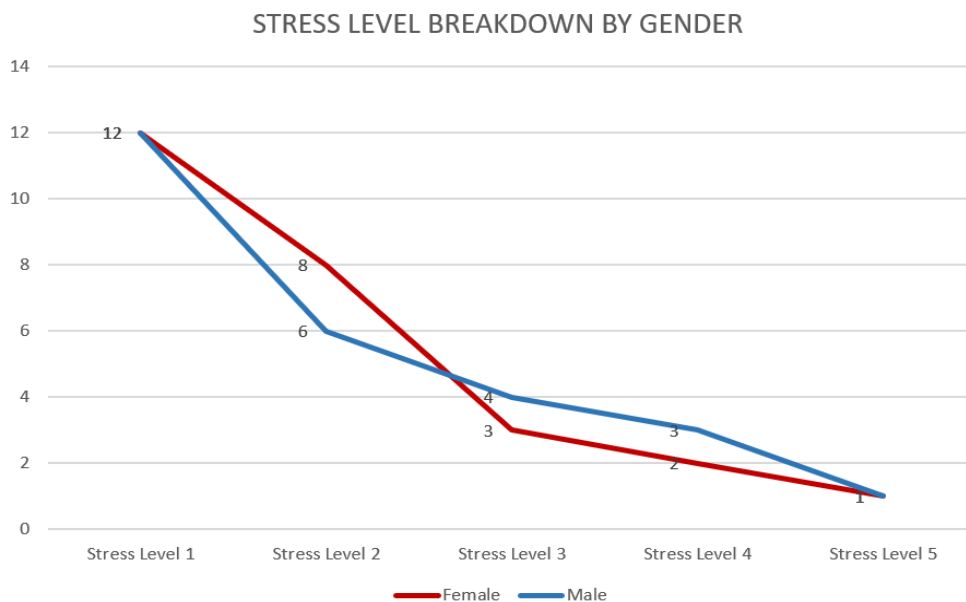
Note: the graph shows the participants quality of life before surgery.

Figure 7



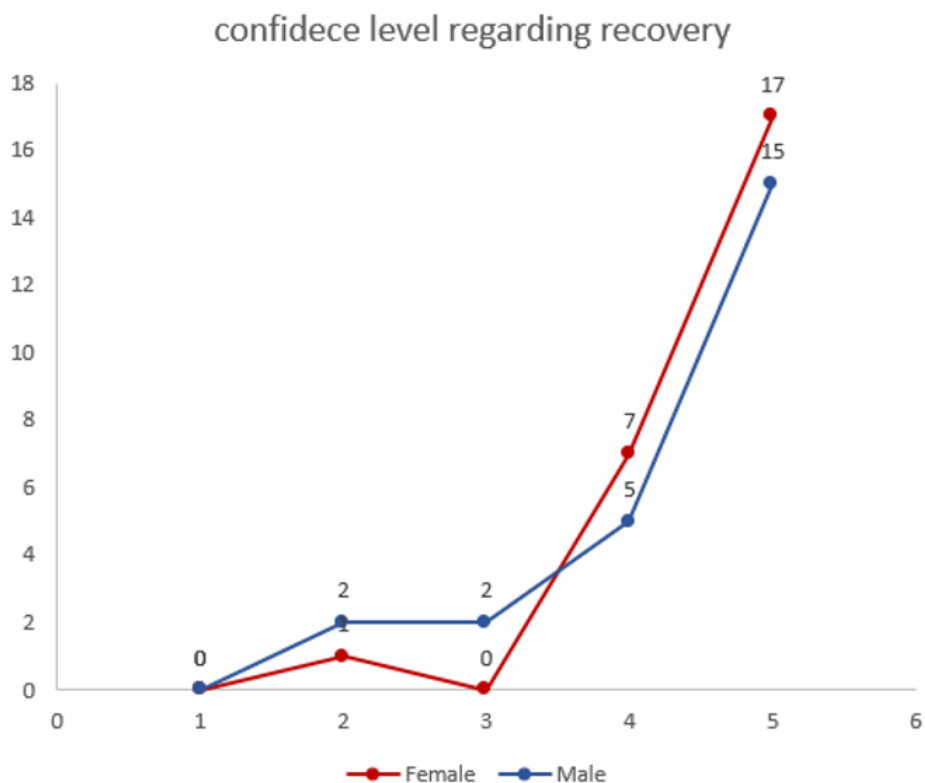
Note: this graph shows the trial of physiotherapy/exercise done by male and female patients.

Figure 8



Note: this graph displays the level of stress of male and female patients, levels are from 1 to 5, 1 being low and 5 being high.

Figure 9



Note: this graph shows the confidence level of participants, levels are 1 to 5, 1 being very low and 5 being high confidence level.

CONCLUSION

This study reveals that both age and gender significantly impact surgical recovery and rehabilitation. Older patients, especially women, are more likely to require surgery due to age-related conditions. Women generally have lower pain tolerance and delay surgery longer than men, often opting for conservative treatments first. This leads to a more severe impact on their quality of life due to prolonged pain. While men and women experience similar stress levels before surgery, men may experience slightly more stress, possibly due to different coping strategies.

Overall, the findings of this study suggest that gender significantly influences how patients experience and manage pain, and how they approach surgery. Age also plays a critical role, as older individuals, particularly women, are more likely to endure prolonged periods of pain before seeking treatment. Understanding these patterns can help healthcare providers tailor pain management and recovery plans more effectively based on age and gender.

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Conflict of Interest

The author(s) declared no conflict of interest.

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