THE PERCEPTION AND ADOPTION OF OFFICE WORKERS IN BANGKOK TOWARDS INTRAVENOUS MULTIVITAMIN THERAPY AS A COMPLEMENTARY TREATMENT FOR MUSCULOSKELETAL PAIN

SETTHASAK SIRIKAMNERD

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on
11 July 2024

.....
Mr. Setthasak Sirikamnerd
Candidate

.....
Assoc. Prof. Prattana Punnakitikashem,
Ph.D.
Advisor

.....
Asst. Prof. Trin Thananusak,
Ph.D.
Chairperson

.....
Assoc. Prof. Vichita Ractham,
Ph.D.
Acting Dean
College of Management
Mahidol University

.....
Sitthichai Tanthasith,
Ph.D.
Committee member

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SETTHASAK SIRIKAMNERD 6249169

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THEMATIC PAPER ADVISORY COMMITTEE: ASSOC. PROF. PRATTANA PUNNAKITIKASHEM, Ph.D., ASST. PROF. TRIN THANANUSAK, Ph.D., SITTHICHAI TANTHASITH, Ph.D.

ABSTRACT

This study investigates the perception and adoption of intravenous (IV) multivitamin therapy among office workers in Bangkok as a complementary treatment for musculoskeletal pain. The research aims to understand workers' awareness, perceived benefits, risks, overall effectiveness, and factors influencing adoption. A mixed-methods approach was used, with 362 participants (342 online and 20 via paper questionnaires) completing surveys in Thai and English. Likert-type and multiple-choice questions assessed demographic data and perceptions. Qualitative insights were gathered through in-depth interviews.

Demographic factors (age, gender, education, income) showed no significant correlation with adoption rates. Significant predictors of adoption included perceived benefits ($r = 0.633$, $p < 0.01$), communication ($r = 0.499$, $p < 0.01$), social impact ($r = 0.431$, $p < 0.01$), and overall perception ($r = 0.621$, $p < 0.01$). Perceived severity of pain had a mild correlation ($r = 0.134$, $p < 0.05$), while perceived barriers showed no significant correlation. Only 21.8% had tried the therapy, indicating limited exposure and knowledge gaps. Barriers to adoption include cost, limited information, service accessibility, and safety concerns. The study highlights the need for better educational resources and communication strategies to enhance awareness and understanding of IV therapy's benefits. Addressing misconceptions and providing evidence-based information is crucial for informed decisions among office workers.

KEY WORDS: INTRAVENOUS MULTIVITAMIN THERAPY, MUSCULOSKELETAL PAIN, COMPLEMENTARY TREATMENT, HEALTHCARE PERCEPTION, PAIN MANAGEMENT

86 pages

CONTENTS

	Page
ACKNOWLEDGEMENTS	**ii**
ABSTRACT	**iii**
LIST OF TABLES	**vii**
LIST OF FIGURES	**viii**
CHAPTER I INTRODUCTION	**1**
1.1 Background and Problem Statement	1
1.1.1 Background	1
1.1.2 Statement of problem	3
1.2 Research Question	4
1.3 Aims and Objectives	4
1.4 Scope of the study	5
1.5 Contribution to knowledge	6
CHAPTER II LITERATURE REVIEW	**7**
2.1 Musculoskeletal pain and Its treatment options	8
2.1.1 Office worker and musculoskeletal problems	8
2.1.2 Pain management for office worker with musculoskeletal problems	9
2.2 Definition of Complementary Medicine and IV multivitamin therapy	12
2.2.1. Complementary medicine (CAM)	12
2.2.2 Intravenous multivitamin Therapy	14
2.2.3 Myers' Cocktail	14
2.2.4 Mixture of "Myers' cocktail"	15
2.2.5 Clinical use of IV vitamins therapy for pain management	16
2.2.6 Risks and Benefits of IV Multivitamin Therapy	17

CONTENTS (cont.)

	Page
2.3 Theoretical Support	18
2.3.1 Theory of Health Belief Model.	18
2.3.2 The Diffusion of Innovations Theory (DOI)	21
2.3.3 Technology Acceptance Model	29
2.4 Conceptual Framework	33
CHAPTER III RESEARCH METHODOLOGY	**35**
3.1 Research Design	35
3.2 Population and Sample Size	37
3.2.1 Population sample	37
3.2.2 Sample Size	37
3.3 Data Collection and Tools	38
3.3.1 Data collection	38
3.3.2 Recruitment Methods:	40
3.3.3 Questionnaire Development	40
3.4 Data Analysis	49
3.4.1 Data Preparation	49
3.4.2 Descriptive Statistics	49
3.4.3 Inferential Statistics	50
3.4.4 Qualitative Analysis of Interview Data	50
3.5 Data Interpretation and Presentation	51
CHAPTER IV RESULT	**52**
4.1 Quantitative Study	52
4.1.1 Demographics	52
4.1.2 Pain in Office Workers	54
4.1.3 Workers perception towards IV multivitamin therapy, benefits, risks, and overall effectiveness	55
4.1.4 Factors that influence adoptions towards intravenous multivitamin therapy	57

CONTENTS (cont.)

Page

4.1.5 The relationship between demographic factors and adoptions towards the behavioral intention of intravenous multivitamin therapy for musculoskeletal pain 57

4.1.6 The correlation between worker perceptions and adoptions 57

4.2 Qualitative Study 59

4.2.1 Demographic 59

4.2.2 Factors Influencing Worker Perception Toward IV Multivitamin Therapy: Benefits, Risks, and Overall Effectiveness 60

4.2.3 Potential knowledge gaps, misconceptions, and barriers to the adoption of IV multivitamin therapy 62

CHAPTER V DISCUSSION AND CONCLUSION 64

5.1 Discussion 64

5.2 Conclusion 67

5.3 Recommendations 68

5.4 Limitations and Future Research 69

REFERENCES 71

APPENDIX 84

Appendix A: Documents Supporting Research Ethics 85

LIST OF TABLES

Table		Page
2.1	Nutrients that make up the modified Myers' cocktail	15
3.1	Survey question #10: Factors Influencing the Adoption of IV Multivitamin Therapy as a complementary treatment for musculoskeletal pain	44
3.2	The survey (#11), Behavioral intention to use.	46
4.1	Demographics	53
4.2	Prevalence of Different Types of Pain Among Office Workers	54
4.3	Treatment Methods for Pain Among Office Workers	55
4.4	Experience with Intravenous Vitamin Therapy	55
4.5	Survey question (Mean and SD)	56
4.6	Correlation between characteristic and adoption	57
4.7	Correlation between perception domain and adoption	58
4.8	Respondent profile for qualitative method	59

LIST OF FIGURES

Figure		Page
2.1	Percentage of work-related musculoskeletal disorders (2013-2015 in Great Britain)	9
2.2	The Health Belief Model	19
2.3	The diffusion S-Curve	22
2.4	Characteristics of an innovation	23
2.5	Technology Acceptance Model	30
2.6	Conceptual framework	34
3.1	The process of the study “The perception and adoption of office workers in Bangkok towards intravenous multivitamin therapy as a complementary treatment for musculoskeletal pain	36
4.1	Flow chart correlation	58

CHAPTER I
INTRODUCTION

1.1 Background and Problem Statement

1.1.1 Background

Office workers frequently report experiencing musculoskeletal pain as a symptom of their jobs (Mohammadipour, Pourranjbar, Naderi, & Rafie, 2018). These conditions are often caused by prolonged sitting in front of a computer, awkward posture, and repetitive motions associated with typing and mouse usage. In addition, a sedentary lifestyle, combined with long hours of sitting and inactivity, can contribute to the development of musculoskeletal pain(Kett, Sichting, & Milani, 2021). The prevalence of musculoskeletal pain in office workers has been increasing in recent years due to the increased use of computers and other technology in the workplace. Studies have shown that up to 80% of office workers experience some form of musculoskeletal pain, with the most common complaints being back pain and neck, as well as pain in the hands, arms, and wrists (Chinedu, Henry, Nene, & Okwudili, 2020).

According to the World Health Organization(WHO) report , a current study of Global Burden of Disease (GBD) in 2019, back and neck discomfort, broken bones, various injuries, osteoarthritis, amputations, and rheumatoid arthritis affect 20-33% of the global population, or 1.71 billion peoples.(Cieza et al., 2020). The most of them are between the ages of 15 and 64, which is still considered working age. In Thailand, there are about 4.6 million office workers. Some workers suffer from skeletal system, neck, shoulder, upper back, and lower back diseases. The average yearly cost of therapy is approximately 26,681 million bath (Department-of-Disease-Control, 2018). In 2021/22, the UK Health and Safety Executive (2022)reported the number of persons suffering from musculoskeletal disorders as a consequence work – related injuries with the incidence of injuries were 1,430 cases per 100,000 cases, the most of these work-related musculoskeletal disorders (WRMSDs) primarily affect the upper limbs or neck (37%),

the back (42%), and the lower limbs (21%).Most WRMSDs develop over time as a result of a workplace injury. They may develop a chronic condition and progress from mild to severe disorders(Williams et al., 2018). These conditions are rarely life threatening but they not only affect personal physical and psychological health (Sihawong, Sitthipornvorakul, Paksaichol, & Janwantanakul, 2016), but also overarching socio - economic effects, including quality of life, health, social and emotional well-being, physical and mental performance, energy, productivity in the workplace, and cost of medical care. Therefore, musculoskeletal problems have become a severe and common problem among office workers.

The management of musculoskeletal pain can be challenging, and there are several treatment options available. Conventional treatments for MSKDs include non-pharmacological modalities, such as physical therapy, massage, , acupuncture, patient education, acupuncture, transcutaneous electrical stimulation(TENS), and interferential current therapy(IFC) (Galasso et al., 2020) and pharmacologic interventions such as trigger point injections, analgesics, anti-inflammatory, and antidepressant drugs are only few of the commonly used in clinical practice. The effectiveness of traditional treatments for musculoskeletal pain varies depending on the type of pain, its cause, and the individual's overall health and medical history. About 39-45% of those have long-term issues and develop chronic conditions, which require multidisciplinary approaches to the effective musculoskeletal pain management (El-Tallawy et al., 2021). Pharmacological, non-pharmacological, and interventional pain management are all necessary for improving patients' health, well-being, and quality of life.

Complementary and alternative medicines are interventional pain management, which including acupuncture, yoga, mind and body techniques, manual medicine (massage, mobilization and manipulation), herbal medications, supplements and vitamins are used to treat chronic musculoskeletal pain (Grazio & Balen, 2011). In the late 1950s, John Myers, a physician from Maryland, is credited with developing the Myers' Cocktail, which is a mixture of vitamins and minerals administered through an IV drip. Myers began using this therapy as part of comprehensive treatment plans for a wide variety of diseases, including chronic pain. He was a pioneer in the use of intravenous (IV) vitamin and mineral therapy and believed that this approach could help alleviate pain and improve overall health. (Gaby, 2002). Following the death of John Myers in

1984, Dr. Alan Gaby, a leading expert in nutritional and integrative medicine, modified the original Myers' Cocktail in the 1990s to create a new formulation that included magnesium, calcium, vitamin B, and vitamin C. This modified version has been used to treat a variety of medical conditions, including acute asthma attacks, migraines, fatigue, fibromyalgia, acute muscle spasm, and seasonal allergic rhinitis, as well as some cardiovascular diseases (Gaby, 2002). The modified Myers' Cocktail (which is also known as intravenous therapy, IV therapy, infusion therapy, or vitamin drip therapy) (Durnin, Kurahashi, Sanders, & Mutafova-Yambolieva) is becoming increasingly popular as a complementary treatment, especially among athletes, celebrities, and office workers seeking to boost their energy levels and overall health. Proponents of this therapy claimed that it can enhance athletic performance, improve skin complexion, reduce stress and anxiety, and even prevent cancer(Gaby, 2002). However, the scientific evidence for the efficacy of IV multivitamin therapy is limited, and there is a lack of regulation and oversight in this field, there is no standardization of the ingredients or dosages used in these treatments. As a result, the safety profile of IVNT is not well-established, and there is a risk of adverse reactions, such as infections or allergic reactions, particularly if the treatment is administered by an untrained practitioner. (Pantuso, 2017) which may affect to the public's perception and attitude in intravenous therapy.

1.1.2 Statement of problem

Musculoskeletal pain is a common condition that affects millions of people worldwide, including office workers. While conventional treatments such as nonsteroidal anti-inflammatory drugs (NSAIDs) and physical therapy are commonly used to manage musculoskeletal pain, complementary therapies such as intravenous (IV) multivitamin therapy are also gaining popularity as a treatment option. However, little is known about the awareness, attitudes, and perceptions of office workers towards IV multivitamin therapy as a complementary treatment for musculoskeletal pain. This lack of information makes it difficult to understand how to promote the adoption of safe and effective complementary therapies in the musculoskeletal pain management and may lead to a suboptimal use of resources for managing pain among office workers in Bangkok. Therefore, there is a need to investigate the perceptions and adoptions of Bangkok office workers towards IV multivitamin therapy as a complementary treatment for musculoskeletal pain, in order to

identify potential barriers to adoption and to develop effective strategies for promoting health and wellness, and increasing access to care for individual who has musculoskeletal pain.

1.2 Research Question

RQ.1 What is the current level of awareness and understanding of IV multivitamin therapy among office workers as a complementary treatment for musculoskeletal pain?

RQ.2 What are the factors that influence office workers' adoptions towards IV multivitamin therapy as a complementary treatment for musculoskeletal pain?

RQ.3 How do the demographic factors of office workers, such as age, gender, and educational level, affect their adoptions towards IV therapy as a complementary treatment for musculoskeletal pain?

RQ.4 What are the barriers to the adoption of IV therapy as a complementary treatment for musculoskeletal pain, according to office workers' perceptions?

1.3 Aims and Objectives

The aim of this research is to investigate the perception and adoption of office workers in Bangkok towards intravenous multivitamin therapy as a complementary treatment for musculoskeletal pain. The objective of this research are as follows:

1. To investigate the extent to which office workers perceive IV multivitamin therapy and how much they understand about its benefits, risks, and overall effectiveness as a complementary in treating musculoskeletal pain.
2. To explore the factors that influence office workers' adoptions towards intravenous multivitamin therapy as a complementary treatment for musculoskeletal pain.
3. To examine the relationship between demographic factors such as age, gender, occupation, and level of education and office workers' adoptions towards behavioral intention of intravenous multivitamin therapy for musculoskeletal pain.

4. to identify potential knowledge gaps, misconceptions, and barriers to the adoption of IV multivitamin therapy among office workers.

1.4 Scope of the study

This research will include both qualitative and quantitative methodologies. Primary data was collected from questionnaires and interviews, while secondary data was analyzed through a literature review. The scope of this study aims to investigate the perception and office workers in Bangkok towards intravenous multivitamin therapy as a complementary treatment for musculoskeletal pain. The study will focus on the following aspects:

1. A review of the existing literature on IV multivitamin therapy for treating musculoskeletal pain in the context of complementary and alternative treatment.

2. Conducting a survey or interview with a sample of office workers in Bangkok to gather data on their perceptions and adoption of IV multivitamin therapy as a complementary treatment for musculoskeletal pain.

3. Analyzing the data to identify the factors that influence office workers' adoptions including the relationship between demographic factors such as age, gender, occupation, and level of education and office workers' perceptions towards intravenous multivitamin therapy for musculoskeletal pain.

4. Identifying any potential knowledge gaps, misconceptions, and barriers to the adoption of IV multivitamin therapy among office workers.

5. Assessing the behavioral intention of office workers to use IV multivitamin therapy as a complementary treatment option for their musculoskeletal pain.

This study will be conducted with a sample of office workers who are living in Bangkok and have experienced musculoskeletal pain. This may include office workers of different ages, genders, educational levels, and occupations from a range of industries and professions, including administrative, finance, legal, and healthcare.

1.5 Contribution to knowledge

The study on Bangkok office workers' perceptions and attitudes towards IV multivitamin therapy as a complementary treatment for musculoskeletal pain has the potential to make a significant contribution to knowledge in several ways.

1. The study may contribute to understanding the level of awareness and knowledge that office workers have about IV multivitamin therapy as a complementary treatment for musculoskeletal pain. By identifying knowledge gaps and misconceptions, the study can inform healthcare professionals and organizations about how to better educate and communicate with office workers about this type of treatment.

2. The research may provide valuable insights into the factors that influence office workers' perceptions and adoptions towards IV multivitamin therapy, including their prior experience with complementary therapies, their trust in healthcare providers, and their perceived barriers to the adoption of this type of treatment.

3. The study may examine how demographic factors such as age, gender, and educational level affect office workers' adoptions towards IV multivitamin therapy as a complementary treatment for musculoskeletal pain. This information can be used to develop targeted interventions and educational programs that are tailored to the needs and preferences of different groups of office workers.

4. The research may identify potential barriers to the adoption of IV multivitamin therapy as a complementary treatment for musculoskeletal pain, according to office workers' perceptions. This information can be used to guide the development of policies and interventions aimed at promoting safe and effective complementary treatments for musculoskeletal pain in the workplace setting.

5. The study may assess how office workers' adoptions towards intravenous multivitamin therapy influence their behavioral intention to use this type of treatment for muscle pain. This information may assist healthcare providers and organizations promote safe and effective complementary treatments for musculoskeletal pain in office workers.

Overall, this study will help healthcare professionals, organizations and entrepreneur in the healthcare sector to improve the understanding of office workers' perceptions and adoptions towards intravenous multivitamin therapy for muscle pain and may inform future research and clinical practice in this area.

CHAPTER II
LITERATURE REVIEW

The researcher gathered academic documents and various research papers to acquire concepts, theories, and research on the variables studied for the perception and adoption of office workers in Bangkok towards intravenous multivitamin therapy as a complementary treatment for musculoskeletal pain. This chapter is divided into the following 3 sections:

2.1 Musculoskeletal pain and Its treatment options

2.1.1 Office worker and musculoskeletal problems

2.1.2 Pain management for office worker with musculoskeletal problems

2.2 Definition of Complementary Medicine and IV multivitamin therapy

2.2.1 Complementary medicine (CAM)

2.2.2 Intravenous multivitamin Therapy.

2.2.3 Myers' Cocktail

2.2.4 Mixture of Myers' Cocktail

2.2.5 Clinical use of IV vitamins therapy for pain management

2.2.6 Risks and Benefits of IV Multivitamin Therapy

2.3 Conceptual Framework

2.3.1 Health Belief Model

2.3.2 Diffusion of Innovation Theory

2.3.3 Technology Acceptance Model

The following are the specifics for each of the sections mentioned above:

2.1 Musculoskeletal pain and Its treatment options

2.1.1 Office worker and musculoskeletal problems

Office workers play a key role in the running of many businesses, with the majority of the work being completed while sitting in front of a computer. An office worker spends up to 8 hours sitting each day Clemes, Patel, Mahon, and Griffiths (2014). The risk of musculoskeletal problem is significantly higher for occupational groups exposed to bad postures while sitting for more than half a day (Lis, Black, Korn, & Nordin, 2007). The prolonged postural loading of the spine when sitting can decrease joint lubrication, increase stiffness, and decrease the fluid content of the muscular and intervertebral discs, which can be detrimental to musculoskeletal pain (Beach, Parkinson, Stothart, & Callaghan, 2005; Wahner-Roedler et al., 2011). In addition to affecting motor coordination and control, prolonged muscular activation in static sitting can induce muscle tension, strains, exhaustion, and other soft-tissue injury. This can also increase the mechanical load on ligaments and intervertebral discs (Granata, Slota, & Wilson, 2004). Additionally, previous study found that women were more likely than men to experience musculoskeletal problems in the head/neck, shoulders, upper back, and ankles/feet (Korhonen et al., 2003). The Health and Safety Executive(2022) reported a prevalence of musculoskeletal problems in office workers and found that work-related musculoskeletal disorders (WRMSDs) primarily affect the upper limbs or neck in 37% of cases, the back in 42% of cases, and the lower limbs in 21% of cases. The study also found that heavy lifting, material manipulation, and keyboard work accounted for 28%, 19%, and 11% of WRMSDs, respectively. In Thailand, approximately 4.6 million office workers. Many of these workers suffer from diseases affecting the skeletal system, including conditions related to the neck, shoulder, upper back, and lower back. According to the (Department-of-Disease-Control, 2018), the average annual cost of therapy for these conditions is approximately 26,681 million baht. Therefore, musculoskeletal problems have become a severe and common issue among office workers.

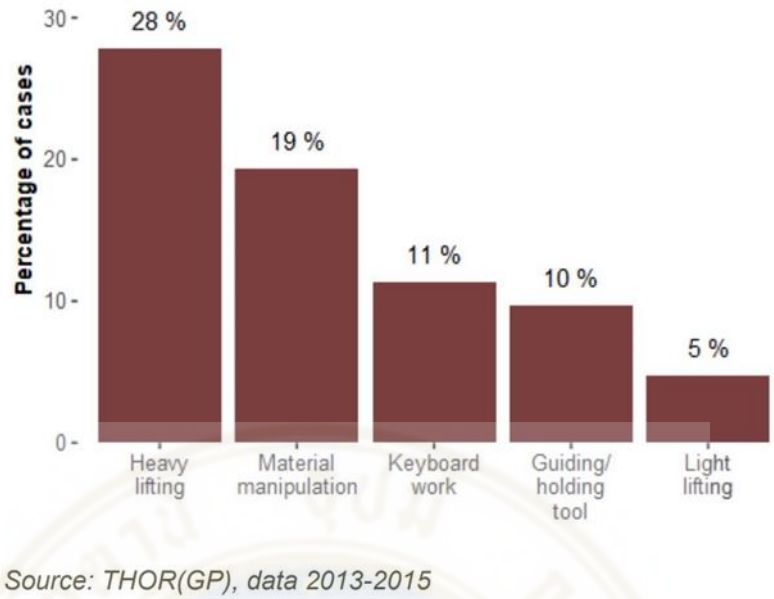

Figure 2.1 Percentage of work-related musculoskeletal disorders (2013-2015 in Great Britain)

2.1.2 Pain management for office worker with musculoskeletal problems

Research on the management of musculoskeletal diseases in office workers has been conducted over the last decade by focusing on long-term health gains. Previous study has shown the effectiveness of pharmacological and non-pharmacological included massage therapy, ergonomic intervention, taping, physical activity, and exercise (Blomgren, Strandell, Jull, Vikman, & Röijezon, 2018; Chen et al., 2018; Cheng & Huang, 2014; Enthoven et al., 1996; Gobbo et al., 2019; Vanti et al., 2015; Waongenngarm, Areerak, & Janwantanakul, 2018). Pain management effects were found to be immediate and persistent in office workers when compared to the control group.

Pharmacotherapy is often used to manage musculoskeletal pain, but it can have side effects and may not be effective for all patients. A systematic review by (Enthoven et al., 1996) found that nonsteroidal anti-inflammatory drugs (NSAIDs) were effective in reducing pain in patients with musculoskeletal conditions, but had a high risk of adverse effects. Another study by Machado et al. (2015) found that opioids were not effective in reducing chronic low back pain and had a high risk of adverse effects.

Exercise is a type of physical exercise that is planned, structured, and repetitive, with the final or intermediate goal of improving or maintaining physical fitness. Physical

fitness refers to a set of attributes that are health-related or skill-related. Previous systematic review was shown the effectiveness of different forms of exercise programs to reduce musculoskeletal pain and enhance muscle strength and flexibility of limbs and the trunk in office workers (Gobbo et al., 2019). The effect of muscle strengthening and stretching was shown result to decrease pain and disability, and quality of life in office workers (Habibi & Soury, 2015; Kim, Kim, & Cho, 2015; Shariat et al., 2018). Exercising while watching videos or under supervision would most likely encourage and ensure the correct execution of the various workouts and facilitate their efficacy. Small duration sessions during the working day can also generate effects, with only 10-15 minutes of tailored exercise performed 3-5 days per week. However, they were not generally applicable to all workstations. Indeed, costs for ergonomic adjustments and reductions in environmental obstacles, which may be crucial for specific facilities, must be considered (Gobbo et al., 2019).

Physical activity is any bodily movement produced by skeletal muscles that requires energy expenditure. Physical activity involves all movement, whether for recreation, transportation to and from places, or as part of a person's job. Office workers are a large group that typically work in a seated position for many hours a day, putting them at a higher risk for the detrimental effects of a sedentary lifestyle (Lis et al., 2007). These people spent over two-thirds of their working hours sitting (Evans et al., 2012; Thorp et al., 2012). The effect of physical activity change was shown in previous study in term job satisfaction, and quality of life (Arslan, Alemdaroğlu, Karaduman, & Yilmaz, 2019). In depth interview in office worker perspective on physical activity was shown gap of knowledge health effect of prolonged sitting and increase their motivation to sit less is considered important (Landais et al., 2022).

Ergonomic intervention as the scientific discipline concerned with the understanding of the interactions between humans and other aspects of a system. Workplace ergonomics relates to interactions between employees and other components in the workplace. It all boils down to matching the task to the person. Arm supports, an ergonomic mouse, an ergonomic chair, and ergonomic training were just a few examples of the various tools or equipment used in ergonomic interventions to help with musculoskeletal problems (Baydur, Ergör, Demiral, & Akalın, 2016; Conlon, Krause, & Rempel, 2008; Gerr et al., 2005; Greene, DeJoy, & Olejnik, 2005; Rempel et al., 2006). Nevertheless, the effectiveness of ergonomic intervention was reported in systematic

review shown arm supports or alternatively designed computer mouse may or may not minimize the occurrence of neck or shoulder musculoskeletal issues among office employees. And, while training in ergonomic principles may not prevent upper limb, neck, or both work-related injuries among office workers (Hoe, Urquhart, Kelsall, Zamri, & Sim, 2018).

Massage therapy, as one of the earliest and most primitive pain relief methods, has long been used to manage muscle pain. It is defined as a therapeutic massage performed with the hands or a mechanical device in which a combination of particular and general techniques, such as effleurage, petrissage, and percussion, are applied repeatedly (Dagenais & Haldeman, 2011). Massage therapy provided moderate evidence for immediate pain relief, whereas traditional Chinese medicine provided inadequate evidence for quick pain relief because to a lack of quality research. However, Massage therapy did not outperform other active therapy in terms of effectiveness (including acupuncture, traction, and other manual therapies). Furthermore, there was no evidence that Massage therapy had superior immediate effects on improving dysfunction in people suffering from muscle pain. There was insufficient evidence of Massage therapy for neck pain in the follow-up effects (Cheng & Huang, 2014).

Taping is one of the most often adopted conservative therapeutic procedures by physical therapists and other health-care providers in the prevention and treatment of sports injuries and a number of clinical disorders, including spinal pain (Alexander, Stynes, Thomas, Lewis, & Harrison, 2003). Tapes were classified into two types: nonelastic or rigid tapes and elastic non adhesive and adhesive tapes, of which Kinesio tape (Kinesio Holding Corp, Albuquerque, New Mexico). The current literature does not support the use of this therapeutic option in spinal disorders, nor does it support the hypothesis that elastic taping has a greater effect than nonelastic taping. Nonsteroidal anti-inflammatory medicines should be evaluated as potential confounding factors. Because of the accompanying changes in position awareness and repositioning tactics utilized in patients with chronic low back pain and neck pain, the impact of tape on additional outcome measures such as proprioception and balance might be of interest (Vanti et al., 2015).

Dietary and vitamin interventions are promising treatment options for musculoskeletal pain in office workers. Vitamin D and omega-3 fatty acids (Fontani et al.,

2010; Jeong et al., 2014) are examples of dietary and vitamin interventions that have been shown to be effective in reducing musculoskeletal pain in office workers. These interventions may be particularly useful for reducing the risk of developing musculoskeletal pain in individuals who spend prolonged periods of time sitting and performing repetitive tasks. The office worker required to spend more time outdoors and make some dietary adjustments to keep their vitamin D levels up(Jeong et al., 2014) or an oral dose of 50,000 international units (IU) of vitamin D given once weekly for 8 weeks can remedy vitamin D insufficiency(Malabanan, Veronikis, & Holick, 1998).

2.2 Definition of Complementary Medicine and IV multivitamin therapy

2.2.1. Complementary medicine (CAM)

Complementary medicine, also known as alternative or integrative medicine, refers to medical practices and treatments that are used in addition to or instead of conventional medicine. These practices are frequently based on traditional knowledge and have been used to treat various health conditions for centuries. Complementary medicine seeks to promote overall health and well-being by focusing on the root causes of disease rather than just treating symptoms.

Some of the most common complementary medicine practices and therapies are:

Acupuncture is one of the most popular complementary medicine treatments. The procedure involves inserting fine needles into specific body points to stimulate healing and relieve pain. It was effective in reducing chronic pain, with significant difference results comparable to traditional pain management methods (Vickers et al., 2012). Acupuncture can also help to reduce the frequency and severity of migraines (Linde et al., 2016), and patients who are open to trying acupuncture as a treatment option should consider it.

Chiropractic treatment is another widely used alternative treatment. To increase mobility and decrease discomfort, chiropractors occasionally manipulate the spine and other joints. Patients with low back discomfort who received chiropractic

therapy reported less pain and better function (Rubinstein, Terwee, Assendelft, de Boer, & van Tulder, 2012). Chiropractic therapy proved beneficial in lowering pain and disability in patients with neck discomfort (Gross et al., 2015) However, while the risk of manipulation is rare, there are serious adverse events concerned with manipulation.

Herbal medicine is a complementary therapy that treats numerous health disorders with herbs and plant extracts. Irritable bowel syndrome (IBS) and inflammatory bowel disease (IBD) were both successfully treated with herbal medicine (Langmead & Rampton, 2001). However, additional study is required to determine the efficacy and safety of herbal medicine in treating various diseases and illnesses.

Massage therapy is popular practice for people looking for relaxation and pain alleviation. Massage therapy's manipulation of soft tissues has been shown to increase blood flow, lessen muscle tension, and facilitate relaxation. Patients with low back pain experienced a reduction in pain and an increase in function after treatment (Cherkin et al., 2011), and cancer patients reported less anxiety in the short term, which may have a beneficial effect on physical cancer symptoms such as pain, nausea, and depression (Wilkinson, Barnes, & Storey, 2008).

Mind-body techniques, such as meditation, yoga, and tai chi, are frequently used to improve mental and emotional well-being, reduce stress, and promote relaxation. Khoury, Sharma, Rush, and Fournier (2015) found that mindfulness-based therapies like meditation were beneficial in lowering anxiety and depression symptoms, and they found similar results for yoga (Cramer, Lauche, Langhorst, & Dobos, 2013).

Homeopathy is another practice of alternative medicine that originated in the late 18th century, founded by Samuel Hahnemann, a German physician. It operates on the principle of "like cures like", suggesting that substances causing symptoms in a healthy person can treat similar symptoms in a sick person. Homeopathic remedies, commonly derived from plants, minerals, or animals, undergo an extensive dilution process that practitioners believe enhances their healing properties Despite this, there was not enough proof to show that homeopathy helped with any health issue (Mathie et al., 2014).

In conclusion, Complementary medicine is often used as a complementary or adjunctive therapy to conventional medicine, rather than as a substitute. Although there is growing evidence to support the effectiveness of certain complementary medicine

practices, such as acupuncture and chiropractic therapy, in treating various health conditions, some people may choose to use complementary medicine exclusively, either due to personal beliefs or because conventional medicine has not been effective in treating their condition (Bishop, Yardley, & Lewith, 2007).

2.2.2 Intravenous multivitamin Therapy

With continuous advances in medical treatments available today, alternative and adjunctive therapies are becoming extremely popular. More than 40% of Americans regularly use complementary and alternative medicine (CAM) therapies, such as vitamins and minerals, to stay healthy and improve their quality of life (Eisenberg et al., 1998). Intravenous (IV) multivitamin therapy (which is also known as intravenous therapy, IV therapy, infusion therapy or IV micronutrient therapy) that involves the administration of high-dose vitamins and minerals directly into the bloodstream via an IV drip may help alleviate the pain of office workers, specifically the use of the Myers' Cocktail, a "solution of water-soluble vitamins and minerals" has been one such therapeutic, advocated for the treatment of a number of conditions by CAM providers (Ali et al., 2009)

2.2.3 Myers' Cocktail

According to a review article by Gaby (2002), Dr. John Myers, a physician from Maryland, was a pioneer in the field of intravenous nutrient therapy during the mid-20th century. He developed an innovative approach to treatment known as the "Myers' Cocktail," a mixture of intravenous (IV) vitamins and minerals. It involves the administration of a mixture of vitamins, minerals, and antioxidants through an IV and has been used as an alternative therapy for various health conditions such as acute asthma attacks, headaches ,migraines, fatigue, fibromyalgia, acute muscle spasm, seasonal allergic rhinitis, cancer, jetlag, Parkinson's disease, depression and also 'detoxification' (Gaby, 2002). Advocates state intravenous multivitamin therapy (IVMT) is superior to oral dietary intake of vitamins because it avoids issues with food sensitivities and gastrointestinal intolerances related to age and medical conditions (Mozayani & Raymon, 2003). It has also been advertised as a preventative therapy to the general public for strengthening the body and immune system. Proponents support

accessing IVMT for people to ‘take control’ of their health, rather than waiting for a health problem to arise.

2.2.4 Mixture of "Myers' cocktail"

Dr. Myers, who developed the original Myers' Cocktail, passed away in 1984, and no published or written material is available regarding the specific contents of his cocktail. Consequently, the current version of the cocktail used in clinical practice is a modification. Dr. Alan Gaby, who took over Dr. Myers' practice after his passing, is responsible for producing this version of the Myers' Cocktail (Gaby, 2002)

Table 2.1 Nutrients that make up the modified Myers’ cocktail

Magnesium chloride hexahydrate 20% (magnesium)	2-5 mL
Calcium gluconate 10% (calcium)	1-3 mL
Hydroxocobalamin 1,000 mcg/mL (B12)	1 mL
Pyridoxine hydrochloride 100 mg/mL (B6)	1 mL
Dexpanthenol 250 mg/mL (B5)	1 mL
B complex 100 (B complex)	1 mL
Vitamin C 222 mg/mL (C)	4-20 mL

Source: Gaby (2002)

- Magnesium (Mg): Magnesium is involved in various physiological processes, including muscle and nerve function, and has been shown to reduce musculoskeletal pain effectively. A systematic review by Bolland, Grey, and Avenell (2018) found that magnesium supplementation effectively reduced musculoskeletal pain in patients with fibromyalgia. In another study, Yousef and Al‐deeb (2013) found that a combination of oral magnesium supplementation and intravenous magnesium infusion helped patients with refractory chronic low back pain with a neuropathic component experience decreased pain intensity and increased lumbar spine mobility.
- Calcium (Ca): Calcium is an essential mineral that plays a crucial role in many bodily functions, such as muscle contraction, nerve transmission, and bone health (Power et al., 1999). While there is no direct evidence to suggest that calcium can reduce pain, some studies have suggested that calcium supplementation may be helpful in

managing certain types of pain. According to a systematic review by Cooper et al. (1996) calcium supplementation can help reduce bone pain in postmenopausal women. Another study found that calcium supplementation effectively reduced muscle pain in women with premenstrual syndrome (Thys-Jacobs, Starkey, Bernstein, Tian, & Group, 1998).

- B vitamins: B vitamins are a group of water-soluble vitamins that are essential for the proper functioning of the body, including the musculoskeletal system. Several studies suggest that B vitamins may help alleviate musculoskeletal pain. The evidence suggests that vitamins B1, B6, and B12 could be useful in treating various pain conditions, relating to the study by Mauro, Martorana, Cataldo, Brancato, and Letizia (2000) on the effect of vitamin B12 supplementation on musculoskeletal pain in patients with chronic low back pain. The study found that vitamin B12 supplementation over 12 weeks led to significant improvements in pain intensity and disability in patients with chronic low back pain.
- Vitamin C:Although the exact role of vitamin C in pain management is not yet fully established, vitamin C is widely used in pain management. Some studies suggest that it may have a beneficial effect in treating certain types of pain. For example, research shows that high-dose intravenous vitamin C is well-tolerated by patients and leads to significant improvements in quality of life, fatigue, and other cancer-related symptoms (Zasowska-Nowak, Nowak, & Ciałkowska-Rysz, 2021). In addition, studies have found that intravenous vitamin C can help to reduce pain scores and the need for opioid medication in postoperative patients (Jeon, Park, Moon, & Yeo, 2016). However, further research is still needed to fully understand the mechanisms by which vitamin C affects pain, as well as its optimal dosages and treatment duration (Carr & McCall, 2017).

2.2.5 Clinical use of IV vitamins therapy for pain management

IV vitamin therapy has been researched for many years to develop treatments for various physical ailments. Several healthcare organizations, including The American College for Advancement in Medicine (ACAM), The American Association of Naturopathic Physicians, The American Holistic Medical Association, and The International Society of Orthomolecular Medicine (ISOM), report the use of Intravenous Micronutrient Therapy (IVMT). Results from an online survey of over 12,000 patient

encounters indicate that IVMT is widely used for a range of illnesses, most frequently for fibromyalgia syndrome and chronic fatigue syndrome, with consistently positive outcomes (Ali et al., 2009).

Pain management is a significant area that has been studied to determine the appropriate characteristics, dosage, and frequency of IV vitamin therapy for pain reduction. A mixture of IV vitamin therapy for pain management that includes malic acid with magnesium, pregabalin with duloxetine, and a monoamine oxidase inhibitor (MAOI) with 5-hydroxytryptophan (5-HTP) has shown a statistically significant trend in reducing pain in patients with fibromyalgia syndrome (Thorpe, Shum, Moore, Wiffen, & Gilron, 2018).

Non-drug approaches have also proven effective in improving health. Magnesium is known to play a role in the stress cycle (Pickering et al., 2020), and participates in cell metabolism, energy production, and the synthesis of nucleic acid and protein. Thiamine or vitamin B1 is essential for numerous cellular processes, such as the synthesis of nucleic acid precursors, myelin, and neurotransmitters (Lonsdale, 2006). Vitamin B3 or Niacin is required for enzyme activity in the body (Hrubša et al., 2022), and Vitamin B6 is necessary for glycogen breakdown and amino acid metabolism (Manore, 2000). Branched-chain amino acids can also impact skeletal muscle metabolites, whole-body metabolism, energy production, and disease (Mann, Mora, Madu, & Adegoke, 2021). These vitamins aid in the process of energy production, including metabolism, which enables muscles to contract and relax. This includes stimulating cytoskeleton muscle repair, resulting in less muscle pain.

2.2.6 Risks and Benefits of IV Multivitamin Therapy

Despite over 70 years of research on the use of intravenous nutrients, there is limited evidence supporting their efficacy. The main benefit observed in studies is the temporary relief of symptoms such as fatigue, asthma, pain, and certain conditions like migraine headaches and fibromyalgia (Gaby, 2002; Massey, 2007; Sun - Edelstein & Mauskop, 2011). However, long-term benefits are only achievable with regular maintenance therapy, which can be costly (Pantuso, 2017).

It's important to note that while some proponents of intravenous multivitamin therapy claim that the treatment can improve energy levels, boost the immune system,

and alleviate symptoms of various medical conditions (Gaby, 2002), there is insufficient scientific evidence to support these claims (Dayal & Kolasa, 2021). Thus, more research is necessary to confirm these findings and establish the safety and efficacy of this treatment.

In addition, intravenous multivitamin therapy is associated with various side effects, ranging from mild to severe, including phlebitis, diarrhea, flatulence, urticaria, angioedema, asthma, hypotension, light-headedness, syncope, and kidney stones. These risks increase when the treatment is administered improperly or without proper medical supervision (Gaby, 2002)

Therefore, it's important to approach intravenous multivitamin therapy with caution and seek guidance from a qualified healthcare provider before considering this treatment as part of a treatment plan. It's also crucial to understand that these treatments are not a substitute for standard medical care and should only be used in conjunction with conventional therapies under the guidance of a qualified healthcare provider (Pantuso, 2017).

2.3 Theoretical Support

2.3.1 Theory of Health Belief Model.

One possible theory that could explain office workers' perception towards the adoption of IV multivitamin therapy as a complementary treatment for musculoskeletal pain is the Health Belief Model (HBM)(Rosenstock, 1974).

The Health Belief Model (HBM) is a widely used theoretical framework in health psychology and behavior change research. The model was first proposed by Irwin M. Rosenstock in the 1950s, and has been adapted and expanded over the years to include additional constructs and factors influencing health behaviors (Rosenstock, 1974). The HBM proposes that an individual's health behavior is determined by their beliefs and perceptions about a health problem, as well as their evaluation of the benefits and costs associated with a particular health behavior. According to the model, four key factors influence an individual's health behavior: perceived susceptibility, perceived severity, perceived benefits, and perceived barriers.

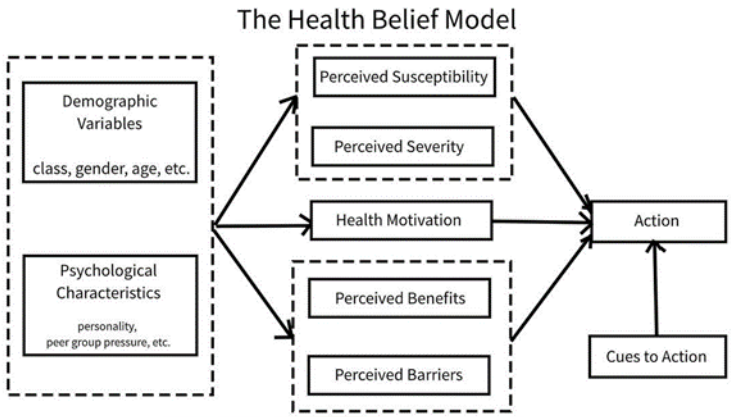

Figure 2.2 The Health Belief Model

Source: Rosenstock (1974).

The Health Belief Model posits that an individual's behavior is influenced by the interplay of six core components: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy.

Perceived susceptibility, as outlined by Glanz et al. (2008), pertains to an individual's belief regarding how a new innovation, idea, or system change might affect them, either positively or negatively. In contrast, perceived severity is anchored in a person's belief about the seriousness of the impact a system change could have on them, potentially disrupting their daily routine.

Further, a perceived benefit embodies the belief that adopting or implementing a program or innovation will lead to advantageous outcomes. On the flip side, the concept of "perceived barrier" encompasses an individual's concerns that engaging in a specific health behavior or new innovation might result in undesirable consequences.

Cues to action serve as strategies or reminders propelling an individual towards the implementation or adoption of a novel innovation or idea. Lastly, self-efficacy speaks to an individual's confidence in their capacity to embrace and integrate a new innovation or idea into their practices.

In the following scenario, the Health Belief Model constructs explained office workers' perception and attitude toward the adoption of IV multivitamin therapy as a complementary treatment for musculoskeletal pain.

Mac was a 39-year-old office worker who had been experiencing musculoskeletal pain in his shoulders and lower back due to the long hours he spent at his desk (Perceived Susceptibility). He had tried various over-the-counter pain medications and physical therapy, but they had not provided long-lasting relief. One of his coworkers suggested trying IV therapy for muscle pain, and Mac was intrigued but skeptical about the treatment's effectiveness (Perceived Benefits).

Mac's doctor explained that IV therapy could provide targeted relief to his sore muscles and speed up his recovery time (Cues to Action and Perceived Benefits). The doctor also addressed Mac's concerns about safety and costs, explaining that IV therapy was generally safe but might not be covered by his insurance (Perceived Barriers).

Despite his initial hesitation, Mac decided to give IV therapy a try, motivated by his desire to alleviate his pain and improve his work performance (Cues to Action). He believed that the therapy would be effective, given the positive experience his coworker had, and trusted his doctor's recommendation (Perceived Benefits and Self-efficacy). After completing the treatment, Mac was pleased with the results and planned to continue using IV therapy as needed to manage his muscle pain (Perceived Severity).

From the provided scenario, an individual who perceived a high level of susceptibility and severity, and a high level of benefits with a low level of barriers, was more likely to engage in a health behavior than an individual who perceived low levels of these factors (Rosenstock, 1974).

There was limited research specifically examining the application of the HBM in the context of IV multivitamin therapy for musculoskeletal pain in office workers. However, studies had shown that the HBM could be applied to understand and predict other health-related behaviors used in various studies to explore health behaviors, including vaccination uptake, cancer screening, and adherence to medication regimens, such as the study of Coe, Gatewood, Moczygemba, and Beckner (2012) which used the HBM to identify predictors of intention to receive the novel H1N1 vaccine, and found that perceived clinical barriers, previous history of influenza vaccination, and physician recommendations were significant predictors of intention to accept the vaccine, while perceived susceptibility was not.

In another study conducted by (Barakat & Kasemy, 2020) titled "Preventive health behaviors during the coronavirus disease 2019 pandemic based on the Health

Belief Model among Egyptians," the objective of the study was to examine preventive health behaviors among Egyptians during the COVID-19 pandemic, specifically focusing on the application of the Health Belief Model (HBM). The researchers collected data from the Egyptian population through online surveys during May 2020. They assessed the participants' demographic characteristics, HBM constructs (perceived susceptibility, severity, benefits, and barriers), and preventive health behaviors. The study found that a higher perception of severity and barriers was associated with increased adherence to preventive behaviors, while perceived benefits were not a significant factor. Additionally, participants with higher levels of education and healthcare workers demonstrated better compliance with preventive measures.

In summary, the Health Belief Model could offer a helpful framework for understanding how office workers might perceive and respond to the prospect of using IV multivitamin therapy for musculoskeletal pain. Perceived susceptibility and severity, benefits and barriers, cues to action, and self-efficacy were key factors that influenced whether an individual was likely to adopt a particular health behavior. Although more research is needed to explore the specific application of the HBM in this context, existing studies suggested that the model had broad applicability across different health behaviors and populations. The scenario involving Mac provided an example of how these constructs might play out in a real-world situation, illustrating the complex interplay of factors that can influence an individual's health decisions.

2.3.2 The Diffusion of Innovations Theory (DOI)

The Diffusion of Innovations Theory is a well-established theory that has been used to understand the adoption of various innovations in many fields, including healthcare (Rogers, Singhal, & Quinlan, 2014). The DoI theory has proved to be a valuable tool for advertisers and marketers, as it provides a predictive framework for how an innovation will be adopted by a social system, and identifies the key factors that influence the rate of adoption (Rogers et al., 2014).

The DoI Theory, formulated by Everett M. Rogers in the 1960s, explains how new ideas, products, or practices are spread and adopted within a social system (Rogers et al., 2014). Rogers was intrigued by the fact that many farmers in his home state of Iowa refused to adopt new farming equipment despite knowledge of its

economic benefits (Rogers et al., 2014). This led him to develop a theory that explained the reasons behind such behavior. However, the idea of the diffusion process was not new, and the understanding of why people made certain decisions was not yet understood. Gabriel Tarde, a French sociologist, conducted the original diffusion research in the early 1900s and identified that the diffusion of new products takes on an S-shaped curve (Rogers et al., 2014). While some innovations were adopted quickly, making the steep curve, others were slow to be accepted and had a flatter curve.

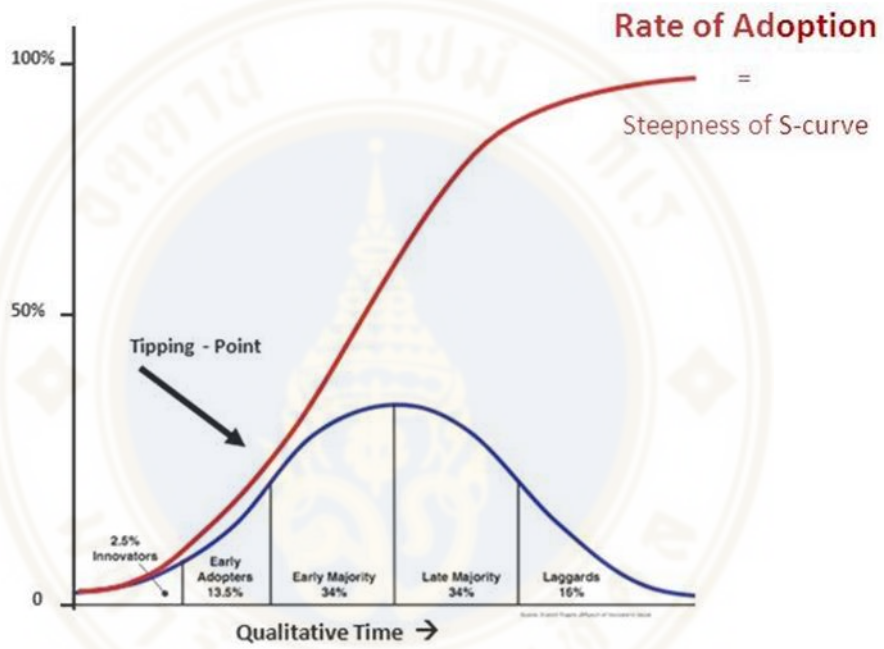

Figure 2.3 The diffusion S-Curve

Source: Rogers et al. (2014)

One of the central concepts of the DoI theory is the adoption curve, which describes the rate at which an innovation is adopted over time. The curve typically takes on an S-shape, with early adopters quickly adopting the innovation, followed by a period of slower adoption by the majority of the population, and then a final phase of adoption by the remaining laggards. The rate of adoption is influenced by several factors, including the characteristics of the innovation, the communication channels used to spread information about the innovation, the social system in which the innovation is being adopted, and the individual characteristics of the adopters (Rogers et al., 2014).

2.3.2.1 The characteristics of the innovation.

An innovation is an idea, product, or practice that is perceived as new by the individual or system considering adoption, and its characteristics play a critical role in the rate of adoption. There are five characteristics of an innovation that are most influential in determining its rate of adoption. These characteristics are:

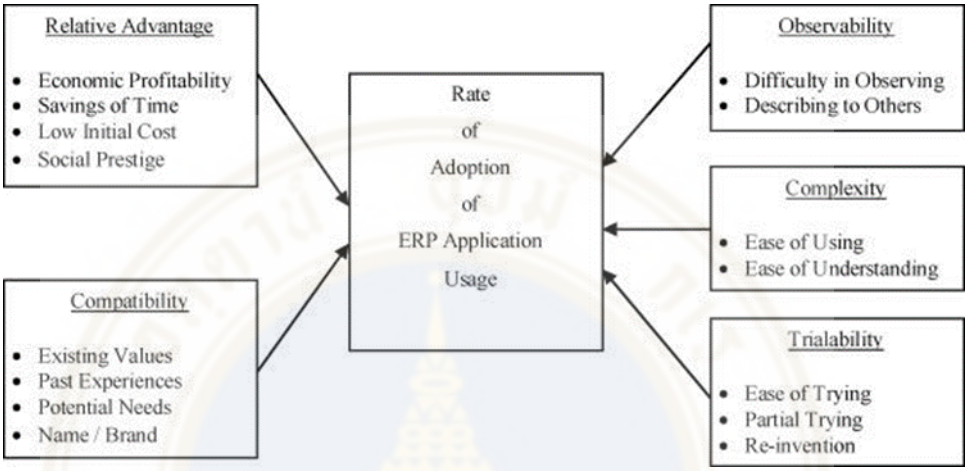

Figure 2.4 Characteristics of an innovation

- Relative advantage

refers to the extent to which an innovation is perceived as better than the existing alternatives. It can be measured in terms of economic benefits, social prestige, convenience, or other relevant criteria. For example, IV Nutrient Therapy offered several advantages over traditional oral supplementation, including faster and more efficient nutrient delivery, higher bioavailability, and the ability to bypass the digestive system and liver metabolism. In contrast to taking vitamins and minerals orally as dietary supplements, the absorption of micronutrients, especially minerals, was often incomplete in the gut (Mozayani & Raymon, 2003). For instance, Padayatty et al. (2004) conducted a study to evaluate the pharmacokinetics of vitamin C in healthy adults following oral and IV administration. The study found that IV administration resulted in significantly higher plasma concentrations of vitamin C compared to oral intake, indicating that IV nutrient therapy could be a more effective way to deliver certain nutrients, including vitamin C. This suggested that IV nutrient therapy had a relative advantage

over oral supplementation, which could increase its adoption and use by patients and healthcare providers.

- Compatibility

refers to the degree to which an innovation is perceived as consistent with existing values, past experiences, and needs of potential adopters. For example, IV Nutrient Therapy was compatible with the growing demand for personalized medicine and holistic health approaches. Eisenberg et al. (1998) conducted a study that revealed a significant increase in the use of alternative medicine between 1990 and 1997, particularly for the treatment of chronic pain conditions such as back and joint pain. These findings suggested that there was a growing demand for alternative approaches to pain management, which IV nutrient therapy could offer. Moreover, IV nutrient therapy aligned with the trend towards patient-centered care and alternative medicine, as it provided a personalized approach to pain management that could be individualized based on a patient's unique nutritional and biochemical needs (Gaby, 2002).

- Complexity

referred to the degree to which an innovation was perceived as difficult to understand or use. Innovations that were too complex may have faced resistance from potential adopters. For example, IV multivitamin therapy involved the intravenous administration of a combination of vitamins and minerals directly into the patient's bloodstream (Gaby, 2002). This delivery method required specialized equipment and medical expertise to ensure the proper administration of the therapy, including selecting the appropriate dosage and monitoring the patient's response to the treatment. As a result, IV multivitamin therapy may have been perceived as complex and potentially risky, especially by patients who were unfamiliar with the administration process (Pantuso, 2017). Moreover, the administration of IV multivitamin therapy was typically performed by a trained medical professional, such as a physician, nurse, or licensed practitioner. This added an additional layer of complexity to the therapy, as it required scheduling an appointment, visiting a medical facility, and potentially incurring additional costs for the administration and monitoring of the therapy.

- Trialability

refers to the degree to which an innovation can be experimented with or tested before adoption. Innovations that can be tried out on a limited basis are

more likely to be adopted than those that require a full commitment from the beginning. For example IV multivitamin therapy can be considered as a trailable innovation, which means that it can be tested on a limited basis to determine its effectiveness and potential side effects(Pantuso, 2017). This trialability is possible in a hospital or clinical setting, where medical professionals can closely monitor patients' reactions and outcomes to the treatment(Dayal & Kolasa, 2021). During the trial period, medical professionals can assess the patient's medical history, current health status, and nutritional needs to determine the appropriate dose and combination of vitamins and minerals to be administered. They can also monitor the patient's response to the treatment, including any potential side effects, and make adjustments as needed.

- Observability

refers to the degree to which the results of an innovation are visible to others. Innovations that are easily observable and produce tangible benefits are more likely to be adopted. For example, IV multivitamin therapy is becoming increasingly observable due to the immediate effects (Lonsdale, Shamberger, Stahl, & Evans, 1999) that patients may experience following treatment. The therapy involves the direct delivery of essential vitamins and minerals into the patient's bloodstream, which may result in a rapid improvement in symptoms related to vitamin deficiencies or other health conditions. Patients who receive IV multivitamin therapy may report feeling more energized, focused, and alert, which may be attributed to the immediate delivery of nutrients directly into the bloodstream. In addition, some patients may observe changes in their skin complexion, such as improved hydration and a reduction in blemishes, which may be attributed to the delivery of nutrients that support skin health. Moreover, IV multivitamin therapy can be tailored to address specific health concerns, such as fatigue, stress, or chronic disease, which may result in observable improvements in symptoms related to these conditions. For example, patients with chronic fatigue syndrome may report feeling more energized and less fatigued following treatment, while patients with chronic pain conditions may report a reduction in pain and improved mobility (Gaby, 2002)

2.3.2.2 Communication channels

Communication channels play a crucial role in the Diffusion of Innovations (DOI) theory. As notes, communication channels are essential for spreading information about innovations and influencing the decision-making process of potential adopters. The theory suggests that the effectiveness of communication channels depends on the characteristics of the potential adopters and the innovation being adopted. For example, early adopters are more likely to rely on interpersonal communication channels, such as peer networks, while later adopters may rely more on mass media channels, such as television and the internet. Moreover, the theory suggests that opinion leaders and change agents play an important role in the diffusion process, as they can facilitate the adoption of innovations by influencing the opinions and behavior of potential adopters. There are study of Valente (2014) to explores the factors that influence access to and use of complementary and alternative medicine (CAM) from a diffusion network perspective. The research distinguishes between diffusion among providers and patients and emphasizes the crucial role of a person's information environment in their decision to use CAM. Policymakers are encouraged to be aware of the informational needs of potential CAM users, and the Valente (2014) notes that early adopters have different characteristics than the middle majority. To assist early adopters in adopting CAM, targeted media should be developed, taking into account the different media channels and messages that are appropriate at different stages of the diffusion process.

2.3.2.3 Social System

In the Diffusion of Innovations (DOI) theory, social systems are considered critical because they can either facilitate or hinder the adoption and diffusion of an innovation. As noted by (Rogers et al., 2014) social systems refer to the network of individuals, organizations, and institutions that are involved in the adoption and diffusion of an innovation. Each entity within this system plays a crucial role in the process of adopting and spreading innovations. Social systems can influence the rate of adoption by shaping the social norms, values, and beliefs of a community. For instance, if an innovation aligns with the values and beliefs of a community, it may be more readily adopted. Additionally, the level of homophily and heterophily among individuals in the social system can impact the rate of adoption. Homophily refers to the tendency of individuals to associate with others who are similar to themselves, while heterophily

refers to the tendency to associate with those who are different. As such, an innovation that is more compatible with the existing social system and is adopted by opinion leaders can more easily diffuse throughout the social system (Rogers et al., 2014).

2.3.2.4 Individual characteristics of adopters / Demographic and Innovativeness

As mentioned by (Rogers et al., 2014), understanding the individual characteristics of potential adopters is essential in designing effective adoption campaigns. Factors such as age, gender, education level, occupation, and personality traits can influence an individual's readiness to adopt an innovation. For instance, younger individuals are often more willing to adopt new innovations compared to older individuals, while individuals with higher levels of education are often more open to new innovations. Personality traits such as openness to experience and innovation have also been found to be positively associated with the adoption of new innovations. Openness to experience reflects an individual's willingness to explore new ideas and take risks, while innovativeness reflects an individual's predisposition to adopt new technologies or practices.

In healthcare, the Diffusion of Innovations Theory has been used to understand the adoption of various innovations, including new treatments, medical devices, and electronic health records (EHRs)(Greenhalgh et al., 2010). The theory has been used to identify the factors that influence the adoption of these innovations, and to develop strategies to increase the rate of adoption (Dearing & Cox, 2018). For example,

During the 2004-5 influenza season, Britto, Schoettker, Pandzik, Weiland, and Mandel (2007) conduct a study to improve influenza vaccination rates for high-risk children and adolescents. The study utilized the Diffusion of Innovation theory to create a multicomponent change package consisting of nine improvement strategies designed to increase immunization of high-risk patients. The intervention targeted 18,866 high-risk children, and 49.7% received the influenza vaccination. Community-based practices that actively participated achieved higher immunization rates than non-participating practices, with the most helpful interventions being posters, walk-in clinics, reminder calls, and special mailings. Overall, the implementation of the change package based on evidence and diffusion of innovation theory resulted in higher immunization rates than typically reported, particularly for community-based primary care practices(Britto et al., 2007).

Another study, (Mann et al., 2021) conducted a study during the COVID-19 pandemic to investigate the factors associated with university students' intention to receive the COVID-19 vaccination in mainland China, using the Diffusion of Innovations Theory. The study collected data from 6,922 university students in mainland China through a cross-sectional survey. The results showed that the intention to receive the free and self-paid COVID-19 vaccination was 78.9% and 60.2%, respectively. The study also found that perceived efficacy of the COVID-19 vaccination, use of social media for COVID-19 vaccine-related information, openness to experience, and descriptive norm were positively associated with the intention to receive COVID-19 free and self-paid vaccination. This study highlights the significance of understanding the factors that affect the intention to receive the COVID-19 vaccination, such as perceived efficacy of the vaccination, use of social media, and descriptive norm, and the moderating role of openness to experience. By considering these factors, healthcare organizations and policymakers can design effective strategies to promote the COVID-19 vaccination among university students in mainland China.

The Diffusion of Innovations theory is a research and practice paradigm that is highly applicable to the complex context of healthcare, both for explanatory and interventionist purposes. This theory identifies the parameters of diffusion processes, including what they are, how they operate, and why some worthy health innovations do not spread more rapidly. By using a set of concepts and approaches, this theory provides valuable insights into understanding the receptivity of individuals and organizations to healthcare policies and practices. Moreover, diffusion principles can be used to accelerate the rate of adoption and broaden the reach of health innovations. The application of these principles can result in more effective and efficient adoption campaigns, leading to greater rates of innovation adoption and ultimately improving patient outcomes. Therefore, the Diffusion of Innovations theory is an essential tool for healthcare organizations to promote the diffusion of health innovations and drive positive change in the healthcare industry (Dearing & Cox, 2018; Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou, 2004).

2.3.3 Technology Acceptance Model

The Technology Acceptance Model (TAM) was first introduced by Davis (1989)as part of his doctoral dissertation at the MIT Sloan School of Management. The TAM was developed based on the Theory of Reasoned Action (TRA) by and was specifically designed to explain and predict the factors that influence users' intention to use a particular new technology or information systems, which can be helpful for designers, developers, and organizations to improve the implementation and adoption of technology solutions.

The two primary factors in the Technology Acceptance Model (TAM) that influence users' intention to use a technology are perceived usefulness (PU) and perceived ease of use (PEOU)(Davis, 1989). These factors are further explained below:

1. Perceived Usefulness (PU): Perceived usefulness refers to the extent to which an individual believes that using a particular technology will enhance their job performance or improve their ability to accomplish a task. When a user perceives a technology as useful, they are more likely to adopt and utilize it. The greater the perceived usefulness, the more likely a user is to form a positive attitude towards the technology and ultimately adopt it. Perceived usefulness is often influenced by factors such as the technology's effectiveness, efficiency, and relevance to the user's needs(Davis, 1989).

2. Perceived Ease of Use (PEOU): Perceived ease of use refers to the degree to which an individual believes that using a particular technology will be free of effort. In other words, it represents how easy or difficult a user perceives the technology to be. If a user finds a technology easy to use, they are more likely to develop a favorable attitude towards it and adopt it. Conversely, if a technology is perceived as difficult to use, users may be less likely to adopt it, regardless of its usefulness. Factors that contribute to perceived ease of use include the technology's user interface, design, intuitiveness, and the availability of support or training resources(Davis, 1989).

3. Behavioral Intention to Use (BI): Behavioral intention regarding technology usage relates to an individual's motivation or readiness to adopt and utilize a technology. This intention often translates into actual usage. Two pivotal factors, Perceived Usefulness (PU) and Perceived Ease of Use (PEOU), strongly influence this behavioral intention. (Davis, 1989).

4. Actual System Use: This is the culmination of the behavioral intention – it's the actual action of using the system.

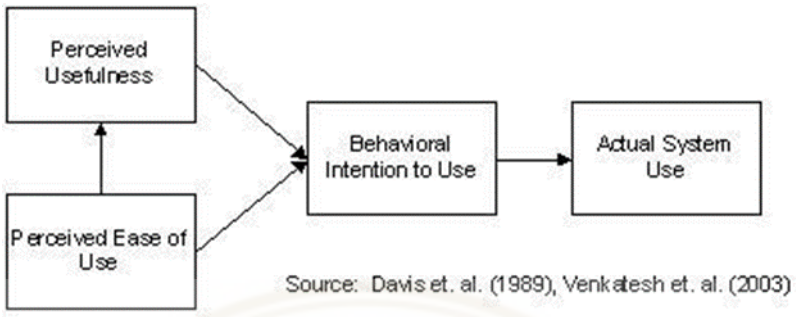

Figure 2.5 Technology Acceptance Model

Since its inception, TAM has been widely applied and adapted across various fields and technologies, leading to numerous extensions and modifications of the original model. of the notable extensions include the TAM2 by Venkatesh and Davis (2000)and the Unified Theory of Acceptance and Use of Technology (UTAUT) by Venkatesh, Morris, Davis, and Davis (2003)

- TAM2: TAM2 was proposed by Venkatesh and Davis (2000)to enhance the original TAM by incorporating additional social and cognitive factors that can influence technology adoption. In TAM2, social influence processes (subjective norms, voluntariness, and image) and cognitive instrumental processes (job relevance, output quality, and result demonstrability) were added to the original model to better predict user acceptance of information systems.

- UTAUT: The Unified Theory of Acceptance and Use of Technology (UTAUT) was proposed by Venkatesh et al. (2003) as a more comprehensive model that integrates various elements from eight different technology acceptance models, including TAM and TAM2. UTAUT identifies four core constructs that influence technology adoption: performance expectancy, effort expectancy, social influence, and facilitating conditions. Additionally, the model considers four moderating variables: gender, age, experience, and voluntariness of use.

Although the TAM has been widely applied to various healthcare settings to understand and predict the adoption of health information systems and technologies,

such as electronic medical records (EMRs)(Holden & Karsh, 2010), telemedicine, and mobile health (mHealth) applications(Gagnon, Ngangue, Payne-Gagnon, & Desmartis, 2016). There is limited literature specifically focused on the application of TAM to IV nutrient therapy. However, some examples of its application to health interventions, which can serve as a basis for exploring the factors influencing the acceptance of IV Multivitamin therapy.

The study of Holden and Karsh (2010), the authors provide an extensive review of the Technology Acceptance Model (TAM) and its applications within the healthcare sector. They explore various adaptations and extensions of the model to understand and predict the adoption of a range of health information systems and technologies, such as electronic health records, telemedicine, and mobile health applications by reviewing, identifying and analyzing over 70 studies that used TAM in healthcare settings. Their review highlights the strengths and limitations of the model and its ability to predict the adoption of technology in the healthcare domain. They also discuss the model's extensions, such as TAM2, TAM3, and the Unified Theory of Acceptance and Use of Technology (UTAUT), which have been developed to address the limitations of the original TAM.

Key findings of the study include:

1. The original TAM is a useful and valuable model for understanding and predicting technology acceptance in healthcare. However, the model has limitations, such as the exclusion of external factors that may influence technology adoption.
2. The authors identified several factors that have been added to the original TAM in various studies, including social influence, trust, system quality, and compatibility. These factors provide a more comprehensive understanding of technology adoption in healthcare settings.
3. The review highlights the need for further research to validate and refine TAM and its extensions in the healthcare domain. The authors suggest that future research should focus on the development of new models and the identification of additional factors that may influence technology adoption in healthcare settings.

Another study by Gagnon et al. (2016), the authors conducted a systematic review focusing on the factors influencing healthcare professionals' adoption of mobile health (m-health) technologies. They aimed to provide insights into the barriers and

facilitators of m-health adoption by examining the available literature on the topic. The systematic review included 34 articles published between 2000 and 2015. The authors identified several factors affecting healthcare professionals' adoption of m-health technologies, which were grouped into four categories:

1. Individual factors: These included factors such as age, gender, experience, education, perceived usefulness, perceived ease of use, and personal innovativeness in technology. The study found that perceived usefulness and perceived ease of use, the core constructs of TAM, were consistently associated with m-health adoption.

2. Organizational factors: Organizational support, resources, training, and leadership were found to be crucial in the adoption of m-health technologies. Additionally, the compatibility of m-health solutions with existing systems and practices influenced healthcare professionals' adoption.

3. Technological factors: The quality, reliability, and performance of m-health technologies played a significant role in their acceptance. User-friendly design and interoperability with existing systems were also important factors.

4. Environmental factors: External factors such as regulations, policies, and social influence were found to impact m-health adoption.

Lastly is a study in Thailand by Kijsanayotin, Pannarunothai, and Speedie (2009), they applied the Unified Theory of Acceptance and Use of Technology (UTAUT) model to investigate the factors influencing the adoption of health information technology (HIT) in Thailand's community health centers (CHCs). They aimed to provide insights into the barriers and facilitators of HIT adoption in developing countries and inform policymakers and practitioners about strategies to improve HIT implementation.

The study was based on a cross-sectional survey conducted among 400 healthcare professionals from 342 CHCs across Thailand. The authors adapted the UTAUT model by including five constructs: performance expectancy, effort expectancy, social influence, facilitating conditions, and HIT experience. They also considered demographic variables such as gender, age, and education.

Key findings of the study include:

1. Performance expectancy, effort expectancy, and social influence significantly influenced healthcare professionals' behavioral intention to use HIT. Among these

factors, performance expectancy had the strongest impact, followed by effort expectancy and social influence.

2. Facilitating conditions and HIT experience directly influenced HIT usage behavior. The study found that healthcare professionals with greater HIT experience and better access to resources, such as training and technical support, were more likely to adopt and use HIT in their daily practice.

3. Demographic variables, such as gender, age, and education, moderated the relationships between the UTAUT constructs and HIT adoption. For instance, performance expectancy had a stronger effect on HIT adoption among younger healthcare professionals, while effort expectancy was more influential for older professionals.

In conclusion, the Technology Acceptance Model (TAM) and its extensions, such as TAM2 and UTAUT, provide valuable frameworks for understanding and predicting the acceptance and adoption of various health technologies. While there is limited literature specifically focused on the application of TAM to IV multivitamin therapy, the model's effectiveness in studying a wide range of healthcare technologies suggests that it could be useful in this context as well.

By applying TAM or its extensions to the context of IV multivitamin therapy, researchers can investigate factors such as perceived usefulness, perceived ease of use, social influence, and other relevant variables that may impact the adoption of this therapy by healthcare professionals and patients. The combination of these factors can then predict an office worker's intention to use IV Multivitamin Therapy in the future. This understanding can guide the design and implementation of IV multivitamin therapy interventions, fostering greater acceptance and enhancing patient outcomes.

2.4 Conceptual Framework

Based on reviewing relevant literature, it is clear that numerous factors can impact the perception and adoption of intravenous multivitamin therapy as a complementary treatment for musculoskeletal pain among office workers in Bangkok. From the Health Belief Model (HBM), Diffusion of Innovations (DoI), and Technology Acceptance Model (TAM), six key factors have been identified as having significant influence on the adoption of this therapy among office workers: perceived severity, perceived

benefits, perceived barriers, communication channels, social influence, and individual characteristics of adopters.

These factors have been selected based on their relevance to the study and are integrated into a conceptual framework depicted in Figure 2.6. This framework helps in comprehending the complex dynamics of factors that contribute to the adoption of intravenous multivitamin therapy among office workers experiencing musculoskeletal pain in Bangkok.

Notably, some factors from the original models were not included due to their lesser relevance in this context. 'Perceived susceptibility' from HBM is not as applicable, given that musculoskeletal pain isn't an infectious disease. 'Trialability' from DoI isn't included because IV therapy, unlike a consumer product, cannot be trialed casually. Finally, 'perceived ease of use' from TAM isn't relevant as IV multivitamin therapy is a treatment administered by professionals, not a technology the user interacts with directly.

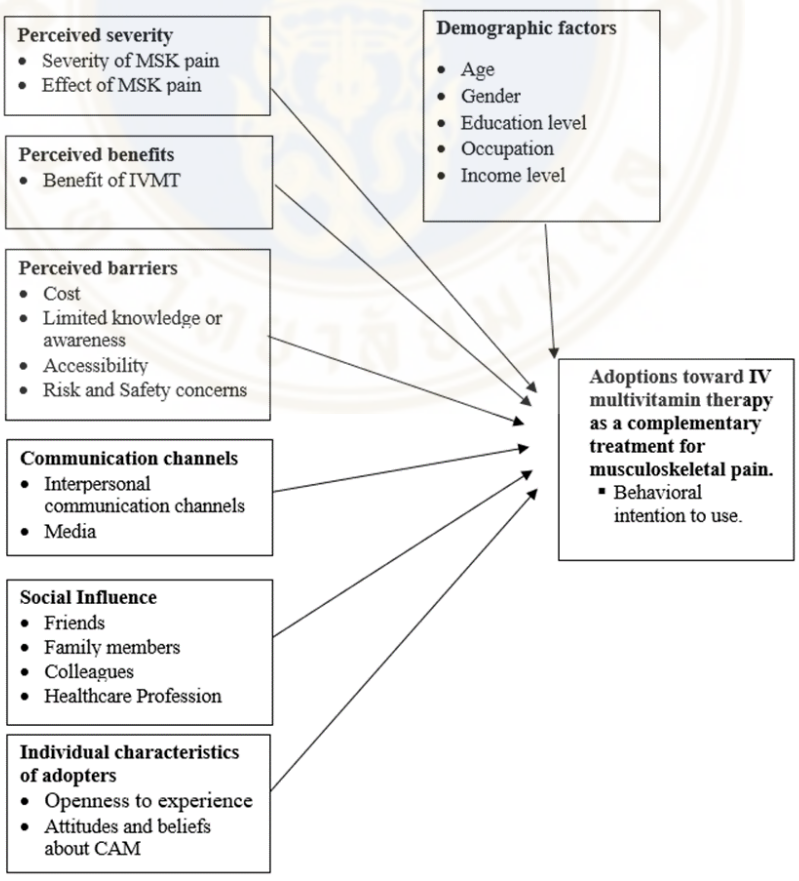

Figure 2.6 Conceptual framework

CHAPTER III
RESEARCH METHODOLOGY

3.1 Research Design

The research design for this study on the perception and adoption of office workers in Bangkok towards intravenous multivitamin therapy as a complementary treatment for musculoskeletal pain will utilized a mixed-methods approach combines both quantitative and qualitative research methodology to provide a more comprehensive understanding of the issue (Teddlie & Tashakkori, 2003). The data obtained through these methods can be combined and analyzed to provide a more complete picture of the issue at hand.

To achieve research objectives 1, 2,3 and 4, a quantitative methodology will be applied. A survey will be employed to gather information on the perceptions of office workers regarding the effectiveness, risks, benefits, and overall understanding of IV multivitamin therapy. Furthermore, factors affecting the adoption of IV multivitamin therapy, such as cost, accessibility, attitudes towards alternative medicine, and perceived effectiveness, will be quantitatively analyzed. The correlation between demographic variables such as age, gender, occupation, and education level and office workers' perception and adoption of IV multivitamin therapy will also be studied through quantitative research. The advantage of using a quantitative approach is that it provides numerical data that can be statistically analyzed to measure the strength and direction of the association between variables (Bryman, 2016). According to Sekaran and Bougie (2016), quantitative research is specifically designed to generate numerical data that can be analyzed using statistical techniques.

The qualitative methodology will be utilized to answer research objective number 2 and 4. The aim is to explore the factors that impact the adoption of IV multivitamin therapy among office workers and to identify potential barriers, knowledge gaps, and misconceptions that prevent adoption. The qualitative research approach is appropriate as it provides a comprehensive understanding of complex phenomena such

as beliefs and attitudes, enabling a deeper understanding of the underlying reasons and motivations behind the adoption and perceptions of IV multivitamin therapy (Creswell & Creswell, 2017).

The primary focus of the research will be to investigate how office workers in Bangkok perceive and adopt intravenous multivitamin therapy as a complementary treatment for musculoskeletal pain. To achieve this, the research process will comprise distinct stages, including the collection of data through surveys and interviews, analysis of data using statistical and qualitative techniques, drawing conclusions based on the findings, and providing suggestions for future research or interventions as Figure 3.1

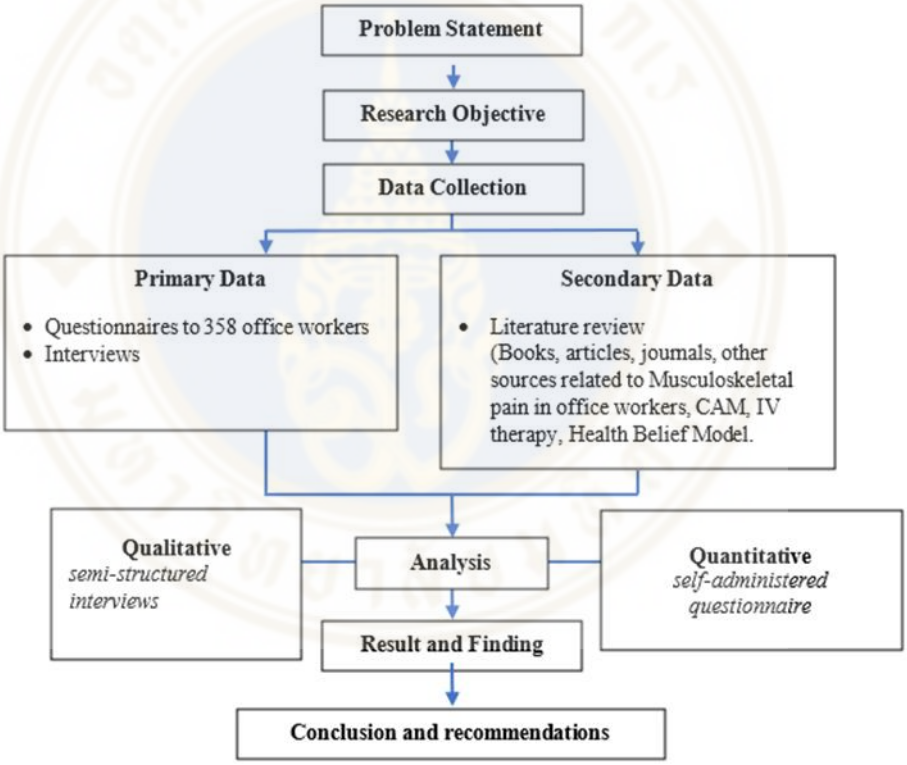

Figure 3.1 The process of the study "The perception and adoption of office workers in Bangkok towards intravenous multivitamin therapy as a complementary treatment for musculoskeletal pain

3.2 Population and Sample Size

3.2.1 Population sample

According to the 'Summary of the Population Work Situation Survey 2020' by the National Statistical Office, the Bangkok metropolitan area employs approximately 3.75 million individuals across government and private sectors. Using data from Janwantanakul et al. (2008), an estimated 63% or about 2.36 million of these workers have reported symptoms of musculoskeletal pain. Thus, this study's target population is specifically the 2.36 million office workers in Bangkok who have experienced such pain. The participants considered for this study represent a diverse cross-section in terms of age, gender, educational background, and occupation, encompassing sectors such as administration, finance, legal, and healthcare both government and private sectors.

3.2.2 Sample Size

Based on the research objective, the sample group for this study consists of office workers in Bangkok who have experienced musculoskeletal pain. However, the population size is unknown, which could make it difficult to determine an appropriate sample size for the study.

To address this issue, the researcher considers using an estimating population proportion method (Kothari, 2004), which involves using a sample from the population to estimate the proportion of the population that possesses a certain characteristic or attribute. This would allow the researcher to obtain a representative sample and make inferences about the population with a certain level of confidence.

In addition, the researcher could use the study by Janwantanakul, Pensri, Jiamjarasrangsri, and Sinsongsook (2008) as a reference to estimate the proportion of office worker with musculoskeletal pain. The study discovered that 742 out of 1428 office workers (63%) reported musculoskeletal symptoms that they associated with work over the course of the past year. This information could be used to inform the sample size calculation and ensure that the study has sufficient statistical power to detect meaningful differences or associations between variables of interest.

The sample size determination calculation is as follows:

$$n = \frac{Z^2_{\frac{\alpha}{2}} p(1-p)}{e^2}$$

Where :

n = sample size

p = the population proportions (the prevalence of office worker experienced musculoskeletal symptom = 0.63)

e = acceptable sampling error (e = 0.05)

z = z value at reliability level. - Reliability level 95% or significance level 0.05; z = 1.96

$$n = \frac{(1.96)^2 \times 0.63 \times 0.37}{(0.05)^2}$$

$$= 358.19 \approx 358$$

The sample size for this research was determined to be at least 358 people to ensure complete results from the questionnaire.

In the qualitative phase of this study, we're narrowing our attention to a distinct group: those who've faced pain in the last 12 months and have received IV multivitamin therapy. Given the specific criteria and based on the principle of data saturation, an initial sample size of approximately 10 participants is interviewed. This sample size aligns with recommendations for exploratory qualitative research, where smaller groups can provide rich insights (Guest, Bunce, & Johnson, 2006).

3.3 Data Collection and Tools

3.3.1 Data collection

The primary data collection methods for this study will be surveys and interviews. Surveys will provide quantitative data on the perceptions, knowledge, and adoption of intravenous multivitamin therapy among office workers, as well as demographic information. The surveys will be conducted online or using paper-based forms in both

Thai and English languages. Likert-type questions with scores ranging from 1 to 5 will be used to assess the opinions of the respondents, and additional question types such as conditional and multiple-choice questions will be used to gather detailed opinions and in-depth information related to specific factors. The survey will focus on topics such as awareness and understanding of intravenous multivitamin therapy, factors influencing the adoption of the therapy, such as cost, accessibility, and perceived effectiveness, and demographic information such as age, gender, occupation, and level of education.

Interviews, on the other hand, will provide qualitative data on individual experiences, attitudes, and barriers to the therapy. The interviews will be conducted through phone interviews or face-to-face conversations between a researcher and a participant, using semi-structured questions to provide in-depth insights into participants' experiences, attitudes, and beliefs about intravenous multivitamin therapy. The interviews will focus on office workers who have experienced musculoskeletal pain and have either adopted or declined intravenous multivitamin therapy. They will explore the factors that influenced their decision to adopt or decline the therapy, as well as their perceptions of its benefits, risks, and overall effectiveness.

The researcher obtained secondary data by gathering academic documents and research papers related to the variables being studied, which is the perception and adoption of intravenous multivitamin therapy as a complementary treatment for musculoskeletal pain among office workers in Bangkok. The purpose of this was to provide an overview of the potential benefits and risks of using IV nutrient therapy and complementary medicine to treat musculoskeletal pain, while also identifying the limitations and gaps in knowledge regarding IV multivitamin therapy. To better understand the factors that affect an office worker's adoption of IV multivitamin therapy, the study utilized the Diffusion of Innovations and Health Belief Model theories, while the Technology Acceptance Model was used to analyze the broader context of adoption and factors that influence an office worker's intention to use this form of therapy.

3.3.2 Recruitment Methods:

3.3.2.1 Quantitative study

For this study, a convenience sampling approach will be employed through the following methods:

- Direct Contact: Engaging with individuals at major office hubs or business centers in Bangkok. Potential participants will be screened using a brief questionnaire to ascertain their experience with musculoskeletal pain.
- Online Surveys: Utilizing professional networks to distribute surveys via platforms like Google Forms.
- Local Organizations Collaboration: Forming partnerships with local entities, including HR departments and health clinics that cater to office workers, to facilitate the identification of potential study participants.

3.3.2.2 Qualitative study

For the qualitative interviews, participants were chosen using a Purposive Sampling method, as outlined by directly selecting 10 -15 individuals who had participated in a prior quantitative study, focusing on those with a history of musculoskeletal pain. We prioritized individuals who had suffered from this pain for a minimum of 12 months and had personally undergone IV multivitamin therapy.

3.3.3 Questionnaire Development

3.3.3.1 Quantitative Study

The survey questionnaire for this study was created using the concepts and ideas gathered from the literature reviews, and it was designed to incorporate the constructs of the Health Belief Model, the Diffusion of Innovation theory, and the Technology Acceptance Model. The survey aims to investigate the various factors that may impact the adoption of intravenous multivitamin therapy as a complementary treatment for musculoskeletal pain among office workers in Bangkok.

The definition of musculoskeletal pain, intravenous multivitamin therapy, and complementary treatment is given in the introduction section to align all respondents on the same scope.

“Musculoskeletal pain is a prevalent health concern among office workers worldwide. Prolonged sitting, poor posture, and repetitive movements

are common work-related factors that can strain the muscles and joints in the neck, shoulders, back, wrists, and hands, leading to musculoskeletal pain.

Intravenous multivitamin therapy is a type of complementary treatment that involves delivering a mixture of essential vitamins and minerals directly into the bloodstream through an intravenous line to help relieve musculoskeletal pain. This type of therapy is used in conjunction with conventional medical treatments to improve overall health and well-being such as.

Enhance athletic performance.

Improve skin complexion.

Reduce stress and anxiety.

Alleviate pain."

- Section 1: Sample Selection Questions

The questions will focus on assessing the participants' experience with musculoskeletal pain(#1) which is the inclusion criteria of this study. The question also includes the area of pain(#2), as well as the types of treatment they have previously used for their pain(#3) (Janwantanakul, Pensri, Moolkay, & Jiamjarasrangsi, 2011). This information will help to establish a baseline understanding of the participants' pain experience and how they currently manage their pain. Lastly, the questions on the participants' prior experiences with IV multivitamin therapy (#4). This aspect is essential as it will provide insights into their firsthand accounts of the therapy, which can give a unique perspective on its efficacy, side effects, and overall acceptance

#1. Have you experienced musculoskeletal pain within the past 12 months?

Yes (Please proceed to the next question) / No (Thank you for completing the survey)

#2. Where do you feel the pain? (You can select more than one area)

a. Neck, shoulders, upper back

b. Arms, elbows, wrists, fingers

c. Lower back

d. Hips, thighs

e. Knees

f. Legs, ankles, foot

g. Other (please specify): _____

#3. What types of treatments have you used to manage your musculoskeletal pain? (Select all that apply)

a. Did not receive any treatment.

b. Medications

c. Physical therapy

d. Massage

e. Chiropractic care

f. Acupuncture

g. Yoga or stretching exercises

h. Other (please specify): _____

#4. Have you ever received treatment with intravenous vitamins (Vitamin drip)?

Yes / No

- Section 2 Demographic information

The second section captures the demographic details of the sample. Information including #5 age, #6 gender, #7 education level, #8 occupation, and #9 income level (Venkatesh et al., 2003) could be gathered to provide a comprehensive picture of the sample. The collected demographic data will be crucial in assessing the varying attitudes and acceptance levels of IV multivitamin therapy across different demographic groups.

#5. Age:

a. 18-24

b. 25-34

c. 35-44

d. 45-54

e. 55-64

f. 65+

#6. Gender:

a. Male

b. Female

c. LGBTQ

d. Prefer not to say.

#7 Level of education:

a. High school diploma or equivalent

b. Bachelor's degree

c. Master's degree

d. Doctorate or professional degree

#8. Occupation:

a. Government official

b. Teacher/Professor

c. State enterprise employee

d. Company employee

e. Financial institution employee

f. Medical professional

g. Own business

h. Others (Please specify) .....

#9. Monthly income level (in Thai Baht):

a. Less than 30,000 baht

b. 30,000 - 59,999 baht

c. 60,000 - 99,999 baht

d. 100,000 - 149,999 baht

e. 150,000 - 199,999 baht

f. 200,000 – 250,000 baht

g. Over 250,000 baht

- Section 3: Factors Influencing the Adoption of IV Multivitamin Therapy as a complementary treatment for musculoskeletal pain (#10)

This section investigates the factors that influence office workers' acceptance of IV multivitamin therapy for musculoskeletal pain relief. Factors could range from the Health Belief Model (Janz & Becker, 1984), the Diffusion of Innovation theory and the Technology Acceptance Model (Venkatesh et al., 2003).

The questions will delve into participants' understanding and perceptions of intravenous multivitamin therapy. They will address participants'

familiarity with the treatment, as well as their beliefs regarding its benefits and potential risks. Additionally, the queries will explore whether participants have discussed complementary medicine with healthcare providers or colleagues and their usual channels for acquiring new health-related information. By capturing this data, we can pinpoint the social communication factors that shape participants' views and acceptance of intravenous multivitamin therapy.

The survey questions in section 3 (#10 : Table 3.1) and (#11: Table 3.2) used a five-point Likert scale, where respondents were asked to rate their level of agreement or disagreement with statements using options such as "Strongly Agree," "Agree," "Neutral," "Disagree," and "Strongly Disagree." The Likert scale, which is also known as a summated rating scale, is a commonly used method in survey research as it allows for a more nuanced assessment of respondents' opinions beyond simple "yes/no" or "agree/disagree" answers. This type of scale is popular among researchers as it enables more detailed insights into respondents' attitudes and opinions on a particular topic (Babbie, 2005; Rossi, Wright, & Anderson, 2013)

Table 3.1 Survey question #10: Factors Influencing the Adoption of IV Multivitamin Therapy as a complementary treatment for musculoskeletal pain

Question	Theory construct	Statement	Reference
10.1	Perceived severity	Musculoskeletal pain can have a significant impact on my overall health and well-being.	(Sihawong et al., 2016)
10.2	Perceived severity	Untreated or poorly managed musculoskeletal pain can lead to more serious health problems over time.	(Williams et al., 2018)
10.3	Perceived benefit	Intravenous multivitamin therapy can be effective in relieving musculoskeletal pain.	(Gaby, 2002)
10.4	Perceived benefit	Intravenous multivitamin therapy can also provide other health benefits, such as improved athletic performance and reduced stress.	(Gaby, 2002)
10.5	Perceived benefit; risk	Intravenous multivitamin therapy might interact positively with my current medications or treatments for musculoskeletal pain.	(Gaby, 2002)
10.6	Perceived benefit	Intravenous multivitamin therapy will help increase the efficiency of my work and daily life.	(Gaby, 2002)

Table 3.1 Survey question #10: Factors Influencing the Adoption of IV Multivitamin Therapy as a complementary treatment for musculoskeletal pain (Cont.)

Question	Theory construct	Statement	Reference
10.7	Perceived barriers; cost	The cost of intravenous multivitamin therapy might deter me from using it as a complementary treatment for musculoskeletal pain.	(Pantuso, 2017)
10.8	Perceived barriers; limited knowledge or awareness	The limited of study and information of intravenous multivitamin therapy makes me hesitant to consider it as a complementary treatment for musculoskeletal pain.	(Dayal & Kolasa, 2021)
10.9	Perceived barriers; Accessibility	I am concerned that it might be difficult to find a healthcare provider or facility offering intravenous multivitamin therapy in my area.	(Pantuso, 2017)
10.10	Perceived barriers ; Safety concerns	I am hesitant to consider intravenous multivitamin therapy due to concerns about its safety as a complementary treatment for musculoskeletal pain.	(Pantuso, 2017)
10.11	Communication channels ;	I often discuss complementary treatments like intravenous multivitamin therapy with my colleagues or coworkers.	(Valente, 2014)
10.12	Communication channels	I have sought advice or information about intravenous multivitamin therapy from a healthcare provider (e.g., doctor, nurse, or pharmacist).	(Valente, 2014)
10.13	Communication channels	I have learn about new treatments or health-related information through online sources (e.g., websites, blogs, or forums).	(Valente, 2014)
10.14	Communication channels	I trust the information about complementary treatments like intravenous multivitamin therapy that I receive from traditional media outlets (e.g., newspapers, magazines, or television).	(Valente, 2014)
10.15	Social Influence	My decision to consider intravenous multivitamin therapy as a complementary treatment is influenced by the opinions and experiences of my friends and family.	(Rogers et al., 2014)
10.16	Social Influence	My healthcare professional's opinion is important to me when considering intravenous multivitamin therapy as a complementary treatment for musculoskeletal pain.	(Rogers et al., 2014)

Table 3.1 Survey question #10: Factors Influencing the Adoption of IV Multivitamin Therapy as a complementary treatment for musculoskeletal pain (Cont.)

Question	Theory construct	Statement	Reference
10.17	Social Influence	Social media (e.g., Facebook, Instagram, or Twitter) and online resources (e.g., websites, blogs, or forums) have impacted my adoption of intravenous multivitamin therapy.	(Mann et al., 2021)
10.18	Social Influence	My colleagues' or coworkers' positive experiences with intravenous multivitamin therapy would increase my likelihood of trying it as a complementary treatment for musculoskeletal pain.	(Kijsanayotin et al., 2009)
10.19	Individual characteristics of adopters (Openess)	I am generally open to trying new complementary treatments for my musculoskeletal pain.	(Rogers et al., 2014)
10.20	Individual characteristics of adopters (Willingness)	I am willing to take risks when it comes to trying new complementary treatments for my musculoskeletal pain.	(Rogers et al., 2014)

Table 3.2 The survey (#11), Behavioral intention to use.

Question	Theory construct	Statement	Reference
11.1	Behavioral intention to use	Overall, the use of intravenous multivitamin therapy as a complementary treatment for musculoskeletal pain is interesting	(Chayomchai, 2020; Venkatesh et al., 2003)
11.2	Behavioral intention to use	Overall, I like to use intravenous multivitamin therapy as a complementary treatment for musculoskeletal pain	(Chayomchai, 2020; Venkatesh et al., 2003)
11.3	Behavioral intention to use	Overall,I will use intravenous multivitamin therapy as a complementary treatment for musculoskeletal pain consistently.	(Chayomchai, 2020; Venkatesh et al., 2003)
11.4	Behavioral intention to use	Overall, I will increase the use of intravenous multivitamin therapy as a complementary treatment for musculoskeletal pain more.	(Chayomchai, 2020; Venkatesh et al., 2003)

- Section 5: Attitudes and beliefs about complementary medicine

The questions will assess the participants' attitudes and beliefs about complementary medicine more broadly, including their willingness to try new treatments, their perceptions of the effectiveness of complementary medicine, and any concerns or reservations they may have about using complementary medicine.

In this section, the survey format consist of a combination of multiple-choice questions, and open-ended questions. This will allow for a comprehensive assessment of participants' attitudes and beliefs about complementary medicine.

12. Which of the following complementary medicine modalities have you tried before for pain management? (Select all that apply)

a) Acupuncture

b) Herbal medicine

c) Chiropractic

d) Yoga

e) Homeopathy

f) IV multivitamin therapy

g) None of the above

#13. Which of the following best describes your feelings about using IV multivitamin therapy for pain management? (Choose one)

a) Very interested

b) Somewhat interested

c) Neutral

d) Somewhat uninterested

e) Very uninterested

#14. In your own words, please describe any concerns or reservations you have about using complementary medicine, including IV multivitamin therapy for pain management:

#15. In your own words, please describe any positive experiences you have had with complementary medicine, including IV multivitamin therapy for pain management, if applicable:

3.3.3.2 Qualitative Study

The open-ended questions are developed in qualitative research because they allow participants to express their thoughts, opinions, and experiences without being restricted to predefined answer choices (Creswell & Creswell, 2017). These questions encourage participants to provide detailed and nuanced responses, which can help you gain a deeper understanding of the factors and barriers in question.

Based on research objectives number 2 and 4, here are some interview questions to explore the factors that influence office workers' adoptions of intravenous multivitamin therapy as a complementary treatment for musculoskeletal pain, as well as potential knowledge gaps, misconceptions, and barriers to adoption:

1. Can you describe your experience with musculoskeletal pain and how it affects your daily life as an office worker?
2. What treatments or therapies have you tried in the past to alleviate your musculoskeletal pain?
3. How did you first learn about IV multivitamin therapy as a potential treatment for musculoskeletal pain?
4. What factors influenced your decision to try or not try IV multivitamin therapy as a complementary treatment for your musculoskeletal pain?
5. Can you share any personal experiences or stories you've heard from others about using IV multivitamin therapy for musculoskeletal pain relief?
6. What are your thoughts on the effectiveness and safety of IV multivitamin therapy as a complementary treatment for musculoskeletal pain?
7. What role, if any, did your healthcare provider play in your decision to consider or not consider IV multivitamin therapy?
8. Are there any misconceptions or knowledge gaps that you've encountered regarding IV multivitamin therapy, either from others or in your own understanding?
9. Do you have concerns or doubts about using IV multivitamin therapy for musculoskeletal pain management?
10. How important is the cost of treatment in your decision-making process when considering IV multivitamin therapy?

11. What sources of information do you rely on when seeking to learn more about potential treatments or therapies for your musculoskeletal pain?

12. How do you think healthcare providers and IV multivitamin therapy providers can address the knowledge gaps, misconceptions, and barriers to adoption that you've mentioned or experienced?

13. In your opinion, what could be done to increase awareness and understanding of IV multivitamin therapy as a complementary treatment for musculoskeletal pain among office workers?

14. How might your workplace play a role in promoting or supporting the use of IV multivitamin therapy as a complementary treatment for musculoskeletal pain?

15 Are there any other factors or personal experiences that you would like to share that have influenced your perception or adoption of IV multivitamin therapy as a complementary treatment for musculoskeletal pain?

3.4 Data Analysis

The data analysis for this study will involve several steps, including data preparation, descriptive statistics, inferential statistics, and qualitative analysis of interview data (Creswell & Creswell, 2017). The primary objective of the data analysis is to investigate the factors that influence the adoption of intravenous multivitamin therapy as a complementary treatment for musculoskeletal pain among office workers in Bangkok.

3.4.1 Data Preparation

The first step in data analysis is to prepare the collected data for analysis. This involves cleaning the data, which includes checking for missing values, data entry errors, and outliers (Field, 2013).

3.4.2 Descriptive Statistics

Descriptive statistics will be used to summarize and describe the main features of the dataset. This includes calculating measures of central tendency (mean), measures of dispersion (standard deviation) and frequency distributions for categorical

variables. Descriptive statistics will provide an overview of the participants' demographic information, their experience with musculoskeletal pain, their perceptions and knowledge of intravenous multivitamin therapy, and their attitudes and beliefs about complementary medicine. (mean, median , and mode), measures of dispersion (range, variance, and standard deviation)

3.4.3 Inferential Statistics

Inferential statistics will be used to explore the relationships between variables and test the research hypotheses (Field, 2013). The following statistical tests may be used, depending on the nature of the data and the research questions:

Pearson's correlation: These tests will be used to examine the strength and direction of relationships between continuous variables, such as perceived severity of musculoskeletal pain and willingness to try intravenous multivitamin therapy.

The level of significance for all statistical tests will be set at $p < 0.05$ (Field, 2013).

3.4.4 Qualitative Analysis of Interview Data

The qualitative data collected from the interviews will be analyzed using thematic analysis, a method that involves identifying, analyzing, and reporting patterns or themes within the data. The analysis will follow six steps, as outlined by Braun and Clarke (2006):

Familiarizing oneself with the data: The researcher will read and re-read the interview transcripts to become familiar with the data.

Generating initial codes: The researcher will identify and code meaningful segments of the interview transcripts that relate to the research questions.

Searching for themes: The researcher will group the codes into broader themes, which will represent patterns in the data.

Reviewing themes: The researcher will review and refine the themes to ensure that they accurately represent the data.

Defining and naming themes: The researcher will provide clear definitions and names for each theme.

Producing the report: The researcher will integrate the themes into a coherent and meaningful narrative that answers the research questions.

The qualitative analysis will provide in-depth insights into the experiences, attitudes, and beliefs of office workers regarding intravenous multivitamin therapy. This analysis will complement the quantitative findings and help to develop a more comprehensive understanding of the factors that influence the adoption of intravenous multivitamin therapy as a complementary treatment for musculoskeletal pain among office workers in Bangkok.

3.5 Data Interpretation and Presentation

The final step in the data analysis process is to interpret the findings and present them in a clear and concise manner (Creswell & Creswell, 2017). This will involve discussing the results in the context of the research questions, the relevant literature, and the theoretical frameworks used in the study (i.e., the Health Belief Model, the Diffusion of Innovation theory, and the Technology Acceptance Model). The interpretation of the results will focus on identifying the key factors that influence the adoption of intravenous multivitamin therapy and understanding the reasons behind these factors.

Data visualization techniques, such as tables, graphs, and charts, will be used to present the results in an easily digestible format. This will help to highlight the main findings and facilitate comparisons between different variables and groups. In addition, the qualitative findings from the interviews will be presented using quotes from the participants to illustrate the themes and provide a richer understanding of their experiences, attitudes, and beliefs.

The presentation of the findings will be followed by a discussion of the study's limitations, implications for practice and policy, and suggestions for future research. This will help to contextualize the findings and provide a roadmap for further exploration of the factors that influence the adoption of intravenous multivitamin therapy and other complementary treatments for musculoskeletal pain among office workers.

CHAPTER IV
RESULT

4.1 Quantitative Study

The study aims to comprehensively investigate the perceptions and adoption of intravenous multivitamin therapy among office workers in Bangkok as a complementary treatment for musculoskeletal pain. It seeks to assess the understanding of the therapy's benefits, risks, and overall effectiveness among office workers (objective 1). Additionally, it explores the factors influencing its adoption, such as cost, accessibility, and attitudes towards alternative medicine (objective 2), examines the correlation of demographic variables like age, gender, occupation, and education level with perceptions and adoption (objective 3), and identifies knowledge gaps, misconceptions, and barriers to adoption to develop effective health promotion strategies (objective 4). A total of 392 individuals initially participated in the survey, with 372 responding via Google Form and 20 through paper questionnaires. After excluding 30 participants who did not have a history of musculoskeletal pain in the past year, 362 valid participants remained for analysis.

4.1.1 Demographics

A total of 362 (100%) participants completed the survey. The gender distribution indicates a higher participation rate from females, with a significant proportion of the sample identifying as female (58.6%). Males made up a substantial portion as well (37.6%), while a small percentage identified as gender nonconforming or transgender (3.3%) or preferred not to answer (0.6%) show in Table 4.1

The age distribution shows that the majority of participants were between 35-44 years old (51.4%), followed by those aged 25-34 years (21.3%) and 45-54 years (20.4%). Younger adults (18-24 years) and older adults (55-64 years) were less represented in the survey, making up 4.4% and 2.5% of the sample, respectively. Table 4.1

The education levels indicate that a majority of participants had a graduate degree (59.7%), with a significant portion also holding a master's degree (30.9%).

Those with a senior high school education constituted a smaller percentage (7.2%), while a very small proportion had a doctorate degree (2.2%). Table 4.1

The income data reveals that the majority of participants earned between 30,000 and 59,999 baht (37.3%), followed by those earning between 60,000 and 99,999 baht (24.3%). A significant portion of participants had incomes under 30,000 baht (20.7%). Fewer participants reported higher income levels, with 9.1% earning between 100,000 and 149,999 baht, and smaller percentages in the higher income brackets. These details are shown in Table 4.1

Table 4.1 Demographics

(N = 362 (100))

Demographics	Total, N(%)
Gender	
Female	212 (58.6)
Male	136 (37.6)
Gender nonconforming or transgender	12 (3.3)
Prefer not to answer	2 (0.6)
Age	
18 – 24 years	16 (4.4)
25 – 34 years	77 (21.3)
35 – 44 years	186 (51.4)
45 – 54 years	74 (20.4)
55 – 64 years	9 (2.5)
Education	
Senior high school	26 (7.2)
Graduate degree	216 (59.7)
Master degree	112 (30.9)
Doctor degree	8 (2.2)
Income	
Under 30,000 Bath	75 (20.7)
30,000 – 59,999 Bath	135 (37.3)
60,000 – 99,999 Bath	88 (24.3)
100,000 – 149,999 Bath	33 (9.1)
150,000 – 199,999 Bath	17 (4.7)
200,000 – 250,000 Bath	4 (1.1)
Over 250,000 Bath	10(2.8)

4.1.2 Pain in Office Workers

The objective of this study is to assess the prevalence of various types of pain among office workers, understand their pain management methods, and explore their experiences with intravenous vitamin therapy. By identifying common types of pain, this research helps us better understand the musculoskeletal issues that IV multivitamin therapy aims to address

4.1.2.1 Prevalence of Different Types of Pain Among Office Workers

The survey reveals a high prevalence of various types of pain among office workers. The most commonly reported type of pain is neck pain, affecting 256 participants (70.7%). Back pain is also prevalent, reported by 176 participants (48.6%). Other common pains include foot and ankle pain (110 participants, 30.4%), thigh and hip joint pain (88 participants, 24.3%), arm and wrist pain (69 participants, 19.1%), and knee pain (64 participants, 17.7%). This data highlights the significant musculoskeletal issues faced by office workers, with neck and back pain being the most frequent complaints shown in Table 4.2.

Table 4.2 Prevalence of Different Types of Pain Among Office Workers

Type of Pain	Number of Participants	Percentage (%)
Neck Pain	256	70.7
Back Pain	176	48.6
Foot and Ankle Pain	110	30.4
Thigh and Hip Joint Pain	88	24.3
Arm and Wrist Pain	69	19.1
Knee Pain	64	17.7

4.1.2.2 Treatment Methods for Pain Among Office Workers

Office workers employ a variety of methods to manage their pain. Stretching is the most commonly used treatment, with 225 participants (62.2%) incorporating it into their routine. Massage therapy is also widely utilized, with 213 participants (58.8%) reporting its use. Physical therapy is another popular method, chosen by 144 participants (39.8%). Less commonly used treatments include medication (100

participants, 27.6%) and acupuncture (56 participants, 15.5%). A small number of participants reported using other pain treatments such as kinesiology tape, dietary supplements, chiropractic care, inhalation therapy, and Thai traditional medicine, with each method being used by a very small fraction of participants shown in Table 4.3.

Table 4.3 Treatment Methods for Pain Among Office Workers

Treatment Method	Number of Participants	Percentage (%)
Stretching	225	62.2
Massage Therapy	213	58.8
Physical Therapy	144	39.8
Medication	100	27.6
Acupuncture	56	15.5
Other	13	3.6

4.1.2.3 Experience with Intravenous Vitamin Therapy

The survey also explored participants' experiences with intravenous vitamin therapy, a less common treatment method for pain. The majority of participants, 283 (78.2%), have not tried this therapy. Only 79 participants (21.8%) reported having received intravenous vitamin therapy shown in Table 4.4.

Table 4.4 Experience with Intravenous Vitamin Therapy

Experience with IV Therapy	Number of Participants	Percentage (%)
Have Not Tried	283	78.2
Have Tried	79	21.8

4.1.3 Workers perception towards IV multivitamin therapy, benefits, risks, and overall effectiveness

The survey results highlight several key perceptions among office workers regarding IV multivitamin therapy. High perceived severity of musculoskeletal pain, with a mean score of 4.23 (SD = 0.954), indicates that participants recognize the serious impact this condition has on their overall health. This is further supported by the high mean score of 4.62 (SD = 0.677) for the impact on overall health.

In terms of perceived benefits, the scores are moderate, with means ranging from 3.13 (SD = 0.829) for relieving musculoskeletal pain to 3.35 (SD = 0.927) for

interacting positively with current medications. These moderate scores suggest that while participants see some value in IV therapy, there is still considerable room for improving their understanding of its full range of advantages.

However, significant perceived barriers, particularly regarding safety (mean = 3.75, SD = 1.133) and cost (mean = 3.60, SD = 1.025), highlight critical areas that need to be addressed to increase the adoption of IV therapy. Participants also noted barriers related to limited information (mean = 3.69, SD = 0.980) and difficulty in finding services (mean = 3.43, SD = 1.208) as shown in Table 8. These findings underscore the necessity for enhanced educational efforts and better communication to mitigate these concerns and facilitate greater acceptance of IV multivitamin therapy among office workers.

Table 4.5 Survey question (Mean and SD)

Survey Items, Means, and Standard Deviations	
Survey item	**Mean (SD)**
Perceived severity (musculoskeletal pain)	4.23 (0.954)
Perceived severity (impact overall health)	4.62 (0.677)
Perceived benefits (relieve musculoskeletal pain)	3.13 (0.829)
Perceived benefits (provide other health benefits)	3.17 (0.877)
Perceived benefits (interacts positively with current medications)	3.35 (0.927)
Perceived benefits (increase the efficiency of work and daily life)	3.27 (0.874)
Perceived barriers (cost of the therapy)	3.60 (1.025)
Perceived barriers (limited information)	3.69 (0.980)
Perceived barriers (difficulty in finding service)	3.43 (1.208)
Perceived barriers (concerns regarding the safety)	3.75 (1.133)
Perceived communication (my colleagues or coworkers)	2.5 (1.224)
Perceived communication (healthcare provider)	2.67 (1.372)
Perceived communication (online sources)	3.43 (1.077)
Perceived communication (traditional media)	3.04 (1)
Perceived Social (friends and family)	3.69 (1.046)
Perceived Social (healthcare professionals)	3.99 (0.888)
Perceived Social (social media)	3.4 (0.997)
Perceived Social (colleagues or coworkers)	4.02 (0.845)
Individual characteristics of adopters (Openness)	3.58 (0.99)
Individual characteristics of adopters (Willingness	3.27 (1.147)

1 = Strongly Disagree; 2 = Disagree; 3 = Neutral; 4=Agree; 5 = Strongly Agree.

SD, standard deviation

4.1.4 Factors that influence adoptions towards intravenous multivitamin therapy

Four questions were given to evaluate the adoption of intravenous vitamin therapy. The use of intravenous multivitamin therapy as an adjunctive treatment for musculoskeletal pain is interesting and scored 3.55 out of 5. The desire to use intravenous multivitamins scored 2.88 out of 5, while the willingness to use intravenous multivitamin therapy scored 2.68 out of 5. The intention to increase the use of intravenous multivitamin therapy scored 2.75 out of 5.

4.1.5 The relationship between demographic factors and adoptions towards the behavioral intention of intravenous multivitamin therapy for musculoskeletal pain

This study has found that age, gender, education, and income had no significant correlation on adoption rates. Therefore, it can be concluded that any individual, regardless of their demographics, has an equal chance of adopting as show in Table 4.6.

Table 4.6 Correlation between characteristic and adoption

Demographic data	Pearson's correlation	p-value
Age	-0.067	0.205
Gender	0.055	0.298
Education	-0.008	0.874
Income	-0.002	0.709

4.1.6 The correlation between worker perceptions and adoptions

There was significant correlation between adoption and perceived severity, with a mild correlation of 0.134 ($p < 0.05$). There was also a moderate correlation between adoption and perceived benefit ($r = 0.633$, $p < 0.01$), communication ($r = 0.499$, $p < 0.01$), social impact ($r = 0.431$, $p < 0.01$), adoption ($r = 0.586$, $p < 0.01$), and summarized perception ($r = 0.621$, $p < 0.01$). There was no significant correlation between adoption and perceived barriers as shown in Table 4.7.

Table 4.7 Correlation between perception domain and adoption

Perception domain	Adoption	
	Pearson's correlation	**P-value**
Severity	0.134*	< 0.05
Benefit	0.633**	<0.01
Barriers	-0.039	0.462
Communication	0.499**	<0.01
Social impact	0.431**	<0.01
Individual characteristics	0.586**	<0.01
Overall perception	0.612**	<0.01

*mild correlation between perception and adoption

**moderate correlation between perception and adoption

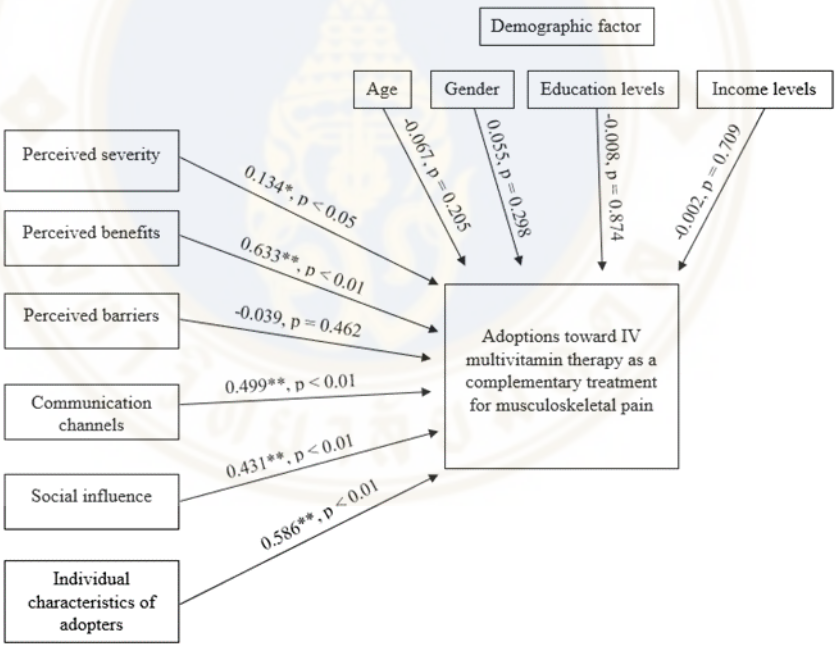

Figure 4.1 Flow chart correlation

*mild correlation between perception and adoption

**moderate correlation between perception and adoption

4.2 Qualitative Study

The Qualitative study is designed to investigate office workers' perspectives and decision-making regarding IV multivitamin therapy, directly supporting Research Objectives 2 and 4. These questions delve into participants' awareness, views on the therapy's effectiveness, and their personal experiences. Specifically, they explore the impact of information sources and healthcare providers (Objective 2), aiming to understand the factors influencing the decision to adopt IV therapy. Additionally, by examining personal and peer experiences, the questions seek to identify subjective opinions and social influences, as well as uncover knowledge gaps and misconceptions (Objective 4). This approach ensures the data collected is comprehensive and relevant, helping to reveal the motivations and barriers to IV therapy adoption and enriching our understanding of its complex adoption process.

4.2.1 Demographic

The participants consist of ten office workers, three men and seven women. Their ages were between 28 and 50 years. The occupations represented in the study are diverse and include finance professionals, marketing managers, project managers, medical sales representatives, HR employees, accountants, bank employees, nurses, and receptionists. Such a varied demographic profile enables an examination of musculoskeletal pain across different job functions and life stages shown in Table 4.8.

Table 4.8 Respondent profile for qualitative method

Participant	Gender	Age	Occupation
P1	Female	30	Flight Attendant
P2	Male	50	Project Manager
P3	Female	42	Accountant
P4	Male	39	Medical device sales representative
P5	Female	38	Marketing Manager
P6	Female	28	HR
P7	Male	45	Finance
P8	Female	46	Finance
P9	Female	33	Bank Employee
P10	Female	36	Nurse

4.2.2 Factors Influencing Worker Perception Toward IV Multivitamin Therapy: Benefits, Risks, and Overall Effectiveness

4.2.2.1 Healthcare Professional Endorsement

Healthcare professionals significantly influence participants' decisions, particularly concerning newer treatments like IV multivitamin therapy. participants frequently seek advice from doctors and other healthcare workers regarding these therapies. Positive endorsements from healthcare professionals can enhance patients' confidence in opting for IV therapy. As one participant noted:

"My physical therapist recommended trying IV multivitamin therapy along with regular treatments" (P7 : a 45-year-old male working in finance).

This participant has suffered from chronic back pain for many years. He has tried physical therapy and pain medication, but these only provide temporary relief. He decided to try IV therapy after the recommendation from a healthcare professional, as the professional's advice gave him the confidence to try a new treatment option.

Conversely, the absence of a recommendation from a healthcare professional or the need for additional information can lead to patient hesitation. In the interviews, I encountered a 39-year-old male with chronic neck and shoulder pain, which sometimes leads to sleep disturbances. He mentioned hesitating to try new treatments without a healthcare professional's recommendation. Reflecting this, he stated:

"If a doctor recommends it, there might be a chance to try it." (P4: a 39 year old Medical device sales representative) His statement highlights the significant role of expert advice in his decision-making regarding the adoption of IV therapy.

4.2.2.2 Information Accessibility and Quality

The accessibility and quality of information are crucial for patients when considering new treatments such as IV multivitamin therapy. Patients increasingly seek comprehensive understanding of the benefits and potential risks before undergoing treatment, reflecting a desire to be well-informed. As one participant expressed:

"Try it, but only after researching and studying the benefits of it." (P6: a 28-year-old female, HR employee). She experiences pain and manages it by practicing Pilates and getting massages. She is someone who likes to read reviews and thoroughly researches before making any decisions. Her approach to trying new treatments

reflects her need to gather detailed information and fully understand the benefits and risks before proceeding.

Nevertheless, another participant highlighted the need for more information regarding the long-term effects of IV therapy, underscoring a communication gap from providers. This gap can lead to uncertainty about the long-term value of such treatments:

“I would like more information on the long-term effects.” (P3: a 42 years old female who work as an accountant). She expressed concerns about potential side effects, reflecting the necessity for comprehensive and transparent communication from healthcare providers.

4.2.2.3 Peer Influence and Anecdotal Evidence

Peers and personal networks play a significant role in influencing health decisions through shared stories and experiences. As a 36-year-old nurse, noted, “The factor that led me to decide on vitamin IV therapy was recommendations from doctors," (P10 : a 36-year-old nurse)who are her colleagues and trusted figures in health matters. This illustrates that people often trust the experiences shared by their friends and family. Positive experiences with IV therapy shared within a social circle can make the treatment seem more relevant and less daunting than just clinical facts.

"See reviews from people who have actually received the service," (P1 : a 30-year-old flight attendant who regularly gets IV drips for skin nourishment). She shared that reading reviews was what initially piqued her interest in trying vitamin IV therapy for pain relief.

However, just because no one mentioned negative experiences doesn’t mean they don’t exist. Negative stories, if shared, could strongly discourage someone from trying IV therapy, as personal experiences often feel more impactful than numbers or studies.

4.2.2.4 Perceived Efficacy and Safety

Perceptions of efficacy and safety are foundational to the acceptance and adoption of any medical treatment. The experiences shared by respondents reflect an assessment of IV therapy’s risk-reward ratio. For a finance professional who suffers from back pain that disturbs sleep, "After the first treatment, I felt I slept better."(P7: a 45-

year-old male working in finance). His personal experience and the immediate benefits of IV therapy contribute to a positive view of its efficacy.

Conversely, another finance professional, a middle-aged woman, has concerns about the treatment's real benefits. She says, "When I first found out, I still didn't dare try it because I didn't know if it would really be effective or not." (P8 : a 46-year-old female working in finance). This highlights a common barrier to adoption: uncertainty and concern about whether the therapy's promised outcomes are achievable and sustainable. This skepticism can be rooted in a general caution toward medical interventions that are perceived as novel or insufficiently proven within the public domain.

4.2.3 Potential knowledge gaps, misconceptions, and barriers to the adoption of IV multivitamin therapy

4.2.3.1 Gaps, Misconceptions, and Barriers

Respondents expressed a need for more information, particularly concerning the long-term effects and everyday implications of IV therapy. Two participants, a 30-year-old female and a 39-year-old male, both emphasized that "I still lack information and understanding about IV vitamin drips." (P1: a 30-year-old flight attendant)

In a similar context, both male and female finance professionals stated, "I would like more information on the long-term effects." (P8 : a 46-year-old female working in finance). This lack of information could result from insufficient communication from healthcare providers or a lack of accessible, easy-to-understand educational materials on IV therapy. Addressing these gaps is crucial, as they can directly impact an individual willingness to consider and trust in the treatment option.

4.2.3.2 Respondent Quotes on Misconceptions

The data reveals concerns about the effectiveness of IV therapy. In the interviews, three respondents expressed "Worry and doubt about the treatment's ability to relieve pain." (P2 : a 50-year-old project manager) These misconceptions could be due to personal experiences where respondents did not notice any improvement in their condition. One participant said, "I feel indifferent; I haven't seen any change. Maybe it needs more sessions," (P8 : a 46-year-old female working in finance)while another stated, "There is no difference after the treatment." (P6: a 28-year-old female, HR employee) Such experiences lead to skepticism about the benefits of the treatment. Additionally,

doubts may be fueled by anecdotal evidence from peers or sensationalized stories online that highlight potential failures or side effects rather than balanced, evidence-based outcomes. Addressing these misconceptions is crucial, as they influence the perceived value and trustworthiness of the therapy, ultimately affecting the decision-making process.

4.2.3.3 Respondent Quotes on Barriers to Adoption

From the interviews, participants expressed various barriers to adoption. For example, a 42-year-old accountant mentioned, "I'm very afraid of needles. Anything that involves needles is my last choice." (P3 : a 42 years old female who work as an accountant) Fear of needles was a significant issue for some, as they are uncomfortable with or afraid of injections.

Financial concerns were another significant barrier; 4 participants stated that cost greatly impacts their decision to adopt for IV vitamin therapy, 2 mentioned it has a moderate impact, while 4 others said, "Price doesn't matter if it really helps with the pain." (P4: a 39 year old Medical device sales representative) Many participants were unsure if the benefits justify the expense, indicating that the cost of IV therapy greatly impacts their decision.

Lastly, anxiety about the treatment was a common concern among all participants. For instance, one 38-year-old female marketing manager said, "I'm worried about side effects and the possibility of vitamins remaining in my body excessively." (P5 : a 38-year-old marketing manager) Another case is a 45-year-old male in finance who stated, "I'm concerned about side effects, afraid of kidney damage." (P7 : a 45-year-old male working in finance) This anxiety further contributed to hesitation in adopting IV therapy.

CHAPTER V
DISCUSSION AND CONCLUSION

5.1 Discussion

The survey results indicate that office workers perceive musculoskeletal pain as having a serious impact on their health, reflected in high scores for perceived severity. While there is some recognition of the benefits of IV multivitamin therapy, the moderate scores suggest a need for improved education to enhance understanding of its advantages. Significant barriers, particularly concerning safety and cost, highlight critical areas that need to be addressed to increase adoption. Efforts should focus on providing comprehensive information and addressing concerns to facilitate greater acceptance of IV therapy.

Earlier studies, such as Gaby (2002), have documented the use of IV therapy for various musculoskeletal pain conditions, including fatigue, muscle pain, and acute muscle spasms. Yousef & Al - deeb (2013) found that combining oral magnesium supplementation with intravenous magnesium injections provided symptom relief for patients with chronic low back pain. Additionally, neuropsychological aspects of pain and increased mobility of the lumbar spine were positively affected. Pain management with vitamin therapy, including malic acid, magnesium, pregabalin, duloxetine, and monoamine oxidase inhibitors (MAOIs) containing 5-hydroxytryptophan (5-HTP), demonstrated a statistically significant trend in reducing pain in fibromyalgia patients (Thorpe et al., 2018).

This study found factors that influence the adoption of IV therapy among office workers in the IV vitamin therapy of muscle pain. It was found to include the benefits of such treatment and the recommendation of healthcare experts to use this treatment. It is important in deciding to receive treatment. In Thailand, access to communication about IV vitamin therapy is still limited, resulting in low public awareness and understanding of its treatment outcomes. Creating media that effectively communicates the analgesic benefits of IV vitamins is essential for increasing acceptance among people with muscle

pain (Valente, 2014). This communication should include treatment principles, methods, results, and side effects, building knowledge and acceptance over time.

Healthcare professional advice is another critical factor in deciding to receive IV vitamin treatment. Due to the novelty of this technique, there are concerns about its acceptance. When the benefits of treatment are confirmed, healthcare professionals' endorsements will aid in the decision-making process (Rogers et al., 2014). It is necessary to receive advice from doctors as an alternative to help treat pain, particularly in office settings. The study found that participants accepted the treatment primarily because their doctors recommended it.

From this study, demographic factors were not related to the adoption of IV vitamin therapy, indicating that general characteristics such as gender, age, education, and income have no impact on the adoption of this treatment. This is in contrast to the findings of Roger in 2014, which stated that factors such as age, gender, education level, occupation, and personality traits can influence an individual's readiness to adopt an innovation. This discrepancy can be explained by two scenarios:

First, musculoskeletal pain affects individuals across all demographic groups: The need for effective pain management drives people to choose treatments based on other factors, such as the effectiveness of the treatment, its side effects, and overall health benefits, rather than demographic factors like age, gender, education level, and occupation. As a result, these demographic factors are often overlooked when selecting a treatment.

Second, sampling Method Flaw: If our sampling method was flawed, it could have affected the representativeness of our results. A non-representative sample might not accurately reflect the broader population of office workers in Bangkok. For example, if our sample was too homogeneous, it might not capture the diversity of the office worker population, leading to biased or misleading conclusions.

However, more perception factors must be considered which is the perception correlations between perceived severity, benefit, communication, social impact, individual characteristics, and adoption of IV vitamin therapy. Although the correlation between perceived severity and adoption was weak ($r = .13$), the correlation coefficients for perceived benefits ($r = .63$) and individual characteristics ($r = .59$) were high, indicating strong relationships. Correlation coefficients between perceived communication, social impact, and adoption were moderate ($r = .30 - .50$). According to Hansen (2005), a

correlation coefficient greater than .50 indicates a strong relationship between the two variables. Thus, understanding the benefits and individual characteristics significantly impacts the decision to adopt IV vitamin therapy.

The finding in this research highlights several challenges with the awareness and adoption of intravenous therapy in adults. First, there were significant knowledge gaps regarding the long-term effects and everyday impact of treatment. This may be due to inadequate communication from healthcare providers and the lack of educational materials that are accessible and easy to understand. This lack of information affects an individual's willingness to consider and trust IV vitamin therapy. Second, misconceptions about the effectiveness of therapy were common. That was often due to personal experience lacking perceived benefits and from anecdotal evidence or emotional stories online. These misconceptions need to be improved to increase IV vitamin therapy's perceived value and credibility. Finally, there were practical and emotional barriers, such as fear of needles, financial concerns, and general anxiety about treatment played a key role in hindering adoption. Overcoming psychological, financial, and emotional barriers is important to improving acceptance and trust in IV vitamin therapy. In summary, providing better information Clarifying misunderstandings, and improving these barriers were an important step in strengthening understanding and adoption of IV therapy

IV vitamin therapy is a new form of treatment that is not yet widely available, and the public, including medical personnel, lacks sufficient knowledge and understanding. Future studies should focus on publishing articles about the benefits of such treatments for muscle pain to increase adoption and continued educational knowledge. Additionally, creating media through the internet and social media can facilitate better access to information, allowing healthcare professionals to recommend the benefits and results of IV vitamin therapy more effectively.

5.2 Conclusion

The study revealed that perception and adoption of IV multivitamin therapy among office workers are relatively low. Only 21.8% of participants had tried this therapy, indicating limited exposure. The qualitative analysis showed that many participants lacked sufficient information about the benefits and risks of IV multivitamin therapy, hindering informed decision-making. This gap in knowledge suggests a need for better educational resources and communication strategies to increase awareness and understanding of IV therapy's potential as a complementary treatment for musculoskeletal pain.

Several factors influence the adoption of IV multivitamin therapy, with perceived benefits and social influences being significant predictors. Participants who believed in the therapy's effectiveness and had positive social reinforcement were more likely to adopt IV therapy. Healthcare professional endorsements also played a crucial role, highlighting the importance of medical advice in the adoption process. Additionally, perceived severity of pain and individual characteristics such as openness to new treatments were moderately correlated with adoption, indicating that personal attitudes and experiences significantly impact decision-making.

The study found no significant correlation between demographic factors (age, gender, education, income) and the adoption of IV multivitamin therapy. This suggests that the likelihood of adopting IV therapy is not significantly influenced by these demographic variables. Instead, adoption is more strongly related to perceptions of the therapy's benefits, communication about the therapy, and social influences. Efforts to increase adoption should focus on changing perceptions and providing better information rather than targeting specific demographic groups.

Several barriers to adoption were identified, including cost, limited information, difficulty finding services, and concerns about safety. These barriers highlight the need for better accessibility and affordability of IV therapy. Addressing misconceptions and providing clear, evidence-based information can help mitigate concerns and encourage more individuals to consider this treatment option. The study also revealed that many participants had never received IV therapy due to a lack of awareness or understanding of its benefits, indicating a significant knowledge gap that needs to be addressed through comprehensive education and communication strategies.

5.3 Recommendations

To increase the acceptance and adoption of IV multivitamin therapy, it is crucial to improve the availability and quality of information regarding its benefits and risks. Healthcare professionals should stay informed of the latest research on IV multivitamin therapy through continued education and participation at medical conferences. They should provide evidence-based, personalized advice during patient counseling and collaborate with physicians, pharmacists, and other specialists. Organizing workshops, webinars, and community dialogues can further promote comprehensive patient education.

Leveraging media effectively is essential. Healthcare providers should utilize social media platforms, health professional websites, and health blogs to share authoritative content, including posts, videos, and infographics. Educational materials should be available in multiple languages and accessible formats to reach diverse populations. Engaging with online health communities can help address public questions and misconceptions. Encouraging endorsements from healthcare professionals can build confidence in IV vitamin therapy, emphasizing the importance of doctors' recommendations, particularly in office settings where musculoskeletal pain is prevalent.

Addressing practical and psychological barriers is critical. Providing supportive measures to overcome barriers such as fear of needles, financial concerns, and general anxiety about treatment is necessary. Implementing financial assistance programs and counseling services can help mitigate these concerns. Additionally, conducting longitudinal studies to evaluate the long-term effectiveness and safety of IV multivitamin therapy, as well as interventional studies to assess the impact of awareness and adoption initiatives, will be valuable. Exploring the integration of digital health tools and telemedicine for delivering ergonomic guidance and pain management support, particularly for office workers, can provide innovative solutions.

5.4 Limitations and Future Research

The study had several limitations that could have impacted the results and their interpretation. Firstly, the sample size was limited to 362 participants. This relatively small sample size may not fully represent the entire population of office workers in Bangkok, potentially limiting the generalizability of the findings. Additionally, the questionnaires were distributed primarily through an online system. This method could introduce biases such as non-response bias or a limited reach to individuals who do not frequently use online platforms, thus affecting the representativeness of the sample. Furthermore, the questions regarding participants' occupations focused on the type of job rather than the nature of the job. This approach may lead to misinterpretations and inaccuracies in understanding the specific occupational factors that influence the adoption of IV vitamin therapy. The study also relied on self-reported data, which can introduce bias. Participants may not accurately recall or may misrepresent their experiences and perceptions, leading to potential inaccuracies in the data collected. Lastly, the cross-sectional nature of the study provides a snapshot of perceptions and behaviors at a single point in time. This design does not capture changes over time, limiting the ability to understand how attitudes and adoption of IV therapy might evolve.

To address these limitations, future research should consider several improvements. Expanding the sample size will enhance the representativeness of the findings, allowing for more generalizable conclusions. A larger, more diverse sample can provide a better understanding of the factors influencing the adoption of IV multivitamin therapy. Utilizing a combination of online and offline distribution methods for the questionnaire to reach a broader audience will help mitigate biases associated with online-only surveys and ensure a more representative sample. Modifying the questions related to occupation to capture more detailed information about the nature of the job, such as physical demands, work environment, and stress levels, will provide a clearer understanding of how different occupational factors impact the adoption of IV therapy. Incorporating objective measures where possible, such as medical records or third-party reports, to complement self-reported data will help validate the accuracy of the information provided by participants. Conducting longitudinal studies to track changes in perceptions and behaviors over time will provide insights into how the adoption of IV therapy evolves and identify long-term trends and factors influencing this process.

By addressing these limitations, future research can provide a more comprehensive and accurate understanding of the factors influencing the adoption of IV multivitamin therapy among office workers. This will enable the development of more effective strategies to promote its use and improve health outcomes.

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APPENDIX

Appendix A: Documents Supporting Research Ethics

Institutional Review Board, Institute for Population and Social Research, Mahidol University (IPSR-IRB)

Established 1985

COA. No. 2023/08-181

Certificate of Approval

Protocol No.: IPSR-IRB-2023-181

Title of Project: The Perception and Adoption of Office Workers in Bangkok Towards Intravenous Multivitamin Therapy as a Complementary Treatment for Musculoskeletal Pain

Approval Includes:

1) Principal Investigator: Mr. Setthasak Sirikamnerd
   Affiliation: College of Management, Mahidol University
2) Submission Form Version Date 6 September 2023
3) Research Proposal Version Date 6 September 2023
4) Interview Guideline Version Date 6 September 2023
5) Questionnaire Version Date 11 August 2023
6) Participant Information Sheet Version Date 11 August 2023
7) Informed Consent Form Version Date 11 August 2023

IPSR-IRB is in Full Compliance with International Guidelines for Human Research Protection such as Declaration of Helsinki, The Belmont Report, CIOMS Guidelines and the International Conference on Harmonization in Good Clinical Practice (ICH-GCP)

Date of Approval: 13 September 2023
Date of Expiration: 12 September 2024

Signature of Chairperson: .....

(Associate Professor Dr. Chalermpol Chamchan)

IPSR-IRB Chair

List of Co-Investigators

-

All IPSR-IRB Approved Investigators must comply with the Following:

1. Conduct the research according to the approved protocol.
2. Conduct the informed consent process without coercion or undue influence, and provide the potential subjects sufficient time to consider whether or not to participate.
3. Use only the Consent Form bearing the IPSR-IRB Approval stamp.
4. Obtain approval of any changes in research activity before commencing and informed research participants about the changes for their consideration in pursuing the research.
5. Timely report to serious adverse events to IPSR-IRB and any new information that may adversely affect the safety of participants.
6. Provide IPSR-IRB the progress reports at least annually or as requested.
7. Provide IPSR-IRB the final reports when completed the study procedures.

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Office of the Institutional Review Board,
Institute for Population and Social Research, Mahidol University (IPSR-IRB)
999 Phuttamonthon 4 Road, Salaya, Nakhon Pathom 73170, Thailand
Tel (662) 441-0201-4 ext. 223
E-mail: ipsrirb@mahidol.ac.th