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Transformative Approaches to Menopause: An Analysis of Bone Health and Quality of Life in Menopausal Women

Dr. M. Thianes Mary

Associate Professor, Department of Social Work, St. Joseph University-Nagaland, India.

Abstract

The World Health Organisation (WHO) defines natural menopause as the permanent cessation of menstruation for 12 consecutive months without any other pathogenic cause because of a decrease in ovarian follicular activity. It usually occurs between the ages of 45 and 55 and is detected retrospectively after a year without menstruation, signifying the end of a woman's reproductive life. A major biological change in a woman's life, menopause is frequently linked to a drop in oestrogen levels, which has a negative impact on bone health and general quality of life. Menopause-related decreased bone mineral density affects social, psychological, and physical well-being by raising the risk of osteoporosis, fractures, chronic pain, and functional restrictions. The purpose of this study is to investigate how menopausal women's quality of life is affected by poor bone health and to talk about how transformative approaches to managing menopause can improve their wellbeing. A probability sampling method was used to choose a sample of 286 menopausal women for a descriptive study design. The results show that bone weakening is more common in women in the early menopausal age range (40–45 and up to 50 years). In order to improve bone health and improve women's quality of life during the menopause, the study emphasises the need for transformative innovative methods that address dietary, lifestyle, social, and healthcare challenges.

Keywords: Bone Health, Innovative methods, Menopause, Osteoporosis & Quality of life.

INTRODUCTION

Menopause is a significant transition in a woman’s life, marked by a natural decline in ovarian function and accompanied by a wide range of physiological and psychological changes. Menopause management should be personalised to meet the needs of each individual woman. Garg, R., & Munshi, A. (2024). As currently stated technologies have emerged as a powerful tool in healthcare, offering support to both women and healthcare professionals in addressing the complexities of menopause. This paper examines the impact of poor bone health on the quality of life of menopausal women and recommends the adoption of transformative approaches in menopause assessment, prevention, and management. It highlights the growing technologies in improving early detection, treatment strategies, and preventive care, while also discussing their potential benefits and challenges in enhancing the overall quality of life of menopausal women

BONE HEALTH

In the view of Khosla, S., et al, (2012) bone is a living tissue that contributes significantly to the structural integrity of the human body. Bone must be strong enough to guard against fractures while remaining light enough to allow for movement and agility. To do this, bone has a core protein matrix with blood, nerve, and lymphatic supply. Strength is produced by mineralisation of the matrix by a mixture of minerals, with calcium being the most essential and the absence of ovarian oestrogen after menopause causes a major reduction in bone strength, putting women at risk for osteoporosis.

Also the Endocrine Society (2022) emphasis that preventing bone loss is a major concern for women during and after menopause. Menopause accelerates bone loss and increases the risk of osteoporosis. Based to studies, up to 20% of bone loss can occur throughout these stages, and osteoporosis affects roughly one in every ten women over the age of 60 worldwide. One in every two postmenopausal women will develop osteoporosis, and the majority will fracture at some point in their lives. Fractures (broken bones) cause discomfort, reduced mobility, and impaired function. Fractures are linked to lower quality of life and higher mortality. Endocrine society emphasises that it is never too late to treat osteoporosis, and aged women are more likely to benefit from early intervention. The treatment plan's goal is to reduce osteoporosis-related fractures while also maintaining bone health.

QUALITY OF LIFE

Quality of Life (QoL) in menopausal women involves physical, psychological, and social well-being, which is significantly threatened by menopause-induced bone loss (osteoporosis); hormonal shifts (estrogen drop) accelerate bone density loss, leading to weaker bones, increased fracture risk (hip, spine, wrist), causing pain, reduced mobility, dependency, depression, and social isolation, thus diminishing overall QoL, According to Greenblum, C. A. (2003), quality of life is a broad, multifaceted notion that is not well defined in the medical literature. According to the World Health Organisation, a person's perspective of their place in life in relation to their position, requirements, norms, and concerns, as well as the culture and value systems in which they live, defines their quality of life. Avis (2004) & 5 Ham, O. K. et al, (2011) indicates that Quality of life tends to decline in midlife women, and there is a need to determine what role, if any, symptoms commonly associated with the transition to menopause and early postmenopausal play in this phenomenon. Col, N. F., Haskins et al,(2009) reveals that Quality of life is an important outcome measure of health care, and understanding the impact of menopause on quality of life is a critically important part of the care of symptomatic postmenopausal women.

OBJECTIVES OF THE STUDY

- To investigate how menopausal women's quality of life is affected by poor bone health.
- To talk about how transformative approaches to manage menopause can improve their wellbeing.

METHODOLOGY

A descriptive study design was adopted to explore issues related to menopause. The study sample consisted of 286 menopausal women selected using a probability sampling method. The Data were analysed using quantitative approaches with cross-tabulation to examine relationships between key variables affecting menopausal bone health and quality of life. The selected participants provided relevant information that supported a comprehensive description of menopausal experiences, particularly in relation to bone health and quality of life.

ANALYSIS AND INTERPRETATION

Table 1:1 Massage to Reduce Pain of the Menopause women (pain in joints, muscles, and the waist)

Parameter	Occupational Status					Total
	Government Employee	Private Employee	Self-Employee	Daily Wages	Home Maker	
Never	20	8	29	24	28	109
	7.0%	2.8%	10.1%	8.4%	9.8%	38.1%
Irregular	8	4	14	12	24	62
	2.8%	1.4%	4.9%	4.2%	8.4%	21.7%
Sometimes	13	11	8	23	20	75
	4.5%	3.8%	2.8%	8.0%	7.0%	26.2%
Frequently	3	3	6	6	12	30
	1.0%	1.0%	2.1%	2.1%	4.2%	10.5%
Always	4	0	4	0	2	10
	1.4%	0.0%	1.4%	0.0%	0.7%	3.5%
Total	48	26	61	65	86	286
	16.8%	9.1%	21.3%	22.7%	30.1%	100.0%

Table 1:1 Massage to Reduce Pain

Menopausal women's use of massage as a pain reliever for musculoskeletal and bone discomfort is seen in Table 1.1, which is broken down by occupational status. According to the study, 8.4% of homemakers practiced massage on an irregular basis, while 10.1% of self-employed women reported never doing so. 1.4% of self-employed women said they always used massage to ease joint, muscle, and waist discomfort, compared to 8.0% of daily wage earners who said they occasionally used it and 4.2% of homemakers who did it frequently. Overall, 61.9% of respondents reported using massage at varied frequencies, suggesting that menopausal bone and joint discomfort is highly prevalent. The fact that homemakers and self-employed women utilise massage more frequently indicates that menopausal bone discomfort has a substantial impact on everyday activities and quality of life, underscoring the need for accessible and supportive non-pharmacological therapies to enhance menopausal women's well-being and early assessment and awareness will lessen the problems.

Table 1:2 : Bone Weakness

Parameter	Age			Total
	40-45 years	46-50 years	51-55 years	
Strongly Disagree	21	14	12	47
	7.3%	4.9%	4.2%	16.4%
Disagree	19	7	18	44
	6.6%	2.4%	6.3%	15.4%
Neutral	28	20	24	72
	9.8%	7.0%	8.4%	25.2%
Agree	20	30	41	91
	7.0%	10.5%	14.3%	31.8%

Strongly Agree	8	16	8	32
	2.8%	5.6%	2.8%	11.2%
Total	96	87	103	286
	33.6%	30.4%	36.0%	100.0%

Table1:2: Bone Weakness

Menopausal women's perceptions of bone weakening by age are seen in Table 1.2. Concerning the perception that their bones were weakening, 7.3% of women between the ages of 40 and 45 strongly disagreed, 6.6% disagreed, and 9.8% stayed neutral. This suggests a lesser or unclear understanding of bone health risks in the early menopausal stage. Conversely, a greater percentage of women in the later age groups agreed that their bones were weakening, with 14.3% of those in the 51–55 age range agreeing and 9.8% of those in the 46–50 age range strongly agreeing. These findings imply that bone health issues worsen with age throughout menopause and have an increasing effect on mobility, physical comfort, and overall quality of life. The findings highlight the significance of early screening, education, and preventive measures to safeguard bone health and enhance menopausal women's quality of life.

1:3 Lower Backache

Parameter	**Age**			**Total**
	40-45 years	**46-50 years**	**51-55 years**	
None	30	29	49	108
	10.5%	10.1%	17.1%	37.8%
Mild	17	22	18	57
	5.9%	7.7%	6.3%	19.9%
Moderate	29	17	25	71
	10.1%	5.9%	8.7%	24.8%
Severe	16	13	9	38
	5.6%	4.5%	3.1%	13.3%
Very Severe	4	6	2	12
	1.4%	2.1%	0.7%	4.2%
Total	96	87	103	286
	33.6%	30.4%	36.0%	100.0%

Table 1:3 Experiencing Lower Backache

Table 1.3 shows the age-related changes in lower back pain among menopausal women, which indicate underlying bone and musculoskeletal health challenges. Although 17.1% of women aged 51 to 55 reported no lower back discomfort, a significant proportion of women aged 40 to 50 suffered pain of various severity. Women aged 46-50 reported 7.7% minimal pain, 10.1% moderate pain, and 2.1% extremely severe pain, whereas 5.6% of women aged 40-45 had severe lower back pain. Overall, 62.2% of menopausal women reported lower back stiffness, showing a significant incidence of bone and spine problems during the menopausal transition. According to healthcare outcomes, persistent lower back pain can considerably impede mobility, sleep, work performance, and daily functioning, lowering quality of life. These findings highlight the importance of early healthcare interventions, such as bone

health screening, pain assessment, posture education, exercise guidance, and lifestyle counselling, in preventing further deterioration, promoting functional independence, and improving menopausal women's overall health.

1:4 Stiffness of Hands and Legs

Parameter	Age			Total
	40-45 years	46-50 years	51-55 years	
None	52	32	49	133
	18.2%	11.2%	17.1%	46.5%
Mild	9	27	22	58
	3.1%	9.4%	7.7%	20.3%
Moderate	15	11	21	47
	5.2%	3.8%	7.3%	16.4%
Severe	16	14	10	40
	5.6%	4.9%	3.5%	14.0%
Very Severe	4	3	1	8
	1.4%	1.0%	0.3%	2.8%
Total	96	87	103	286
	33.6%	30.4%	36.0%	100.0%

Table 1: 4 Experiences on Stiffness of Hands and Legs

The table no.1:4 explain age-related disparities in hand and leg stiffness and muscle weakness in menopausal women, indicating alterations in bone and musculoskeletal health. Among women aged 40 to 45, 18.2% had no stiffness, whereas 5.6% had severe and 1.4% had very severe muscle weakness, indicating that some women are possibly experiencing early functional decline. In the 46-50 age group, 9.4% reported mild weakness, while 7.3% of women aged 51-55 reported moderate weakness. Overall, 46.5% of respondents reported no stiffness, primarily among those aged 51 to 55, however mild weakness was prevalent. Muscle weakness and stiffness decrease mobility, self-care abilities, and everyday functioning, lowering quality of life, highlighting the importance of early detection and preventative bone health interventions.

RESULT

DISCUSSION

The study found that bone and joint conditions have a major impact on menopausal women's quality of life, with pain, stiffness, and perceived weakness in the bones impairing everyday functioning across all age groups. The high prevalence of massage use (61.9%) suggests widespread joint, muscle, and waist pain, particularly among homemakers and self-employed women, highlighting the impact of bone discomfort on everyday activities and well-being. Age-related perceptions of bone weakness are limited in early menopause (40-45 years), whereas women in later phases (46-55 years) report increasing bone degradation, impaired mobility, and physical discomfort. Lower back discomfort, reported by 62.2% of respondents, as well as hand and leg stiffness, indicate gradual musculoskeletal degeneration, which can lead to poor mobility, sleep disruptions, reduced work capacity, and loss of independence. These findings indicate the urgent demand for transformational approaches to menopausal care, such as early

detection, nursing-led education, lifestyle changes, non-pharmacological pain management, and AI-enabled digital health interventions. Such comprehensive, woman-cantered solutions can encourage early identification, prevent bone loss, alleviate pain and functional restrictions, and improve menopausal women's overall quality of life.

ADOPTING A TRANSFORMATIVE APPROACH TO MENOPAUSE

A transformative approach prioritises early detection of risk indicators such as decreased bone mineral density, muscle weakness, and functional limitations, particularly in the early menopausal period. It promotes lifestyle changes such as nutrition, physical activity, posture management, and stress reduction, in addition to non-pharmacological pain management techniques. Nursing-led education and counselling play an important role in providing women with knowledge, self-care skills, and informed decision-making, promoting increased autonomy and adherence to healthy behaviours.

The use of AI applications, such as digital health tools for risk assessment, symptom tracking, and personalised treatment planning, complements this approach by allowing for rapid interventions and continuous monitoring. Furthermore, Multidisciplinary coordination among healthcare professionals offers a comprehensive approach that addresses health symptoms, emotional well-being, and social functioning. The transformative approach to menopause care promotes healthier ageing and improves menopausal women's quality of life by moving from a fragmented, treatment-oriented model to an integrated, preventive, and supportive framework.

ARTIFICIAL INTELLIGENCE APPLICATIONS IN MENOPAUSAL MANAGEMENT. RISK PREDICTION AND PREVENTION

Garg, R., & Munshi, A. (2024) wrote to the Journal of Mid-life Health that AI algorithms can sift through large datasets to identify women who are at a higher risk of developing menopausal problems including osteoporosis, cardiovascular disease, and cognitive loss. By combining clinical, genetic, and lifestyle data, AI models can provide personalised risk evaluations and preventive actions. For example, Wu et al. (2020) demonstrated the use of machine learning algorithms to predict the probability of osteoporotic fractures in postmenopausal women, allowing for early interventions to decrease bone health hazards.

SYMPTOM MANAGEMENT

Garg, R., & Munshi, A. (2024) indicates that AI-powered virtual assistants and chatbots are wonderful resources for women, providing personalised assistance and information about menopause symptoms. These AI entities help women make informed decisions about treatment options and lifestyle changes. AI can analyse massive quantities of data from individual health records, wearable devices, and self-reported symptoms to make tailored recommendations for managing specific menopausal symptoms. For instance, an AI-powered system can track a woman's sleep habits, mood variations, and hot flash frequency to recommend personalised therapies such as lifestyle changes, food tweaks, or hormone medication. Smith et al. (2021) demonstrate this concept with the MenoBot, which uses natural language processing to provide individualised advise on symptom management, hormone therapy, and alternative treatments based on individual preferences and medical history.

RECOMMENDATIONS AND WAY FORWARD

In the current scenario, innovations and technologies, particularly artificial intelligence (AI), are playing a vital role in healthcare and other fields. In menopause care, companies like Stellarix, a strategy and innovation consulting firm, focus on Transforming Menopause Health: Innovations and Path Forward. Advances in diagnostic and treatment technologies have significantly improved the assessment, understanding, and management of various menopausal health issues, offering opportunities for more personalised, proactive, and effective care.

Diagnosis Technologies: The primary focus is on screening for potential abnormalities and identifying symptoms using AI-driven health tracking applications, sensor-enabled smart clothes, light-based silicon photonic biosensors for hormone trackers, smart algorithms-based urine testing equipment, and so on.

Treatment Technologies: Include a variety of methods for controlling menopausal symptoms and associated health concerns, such as laser-based vaginal devices, brain stimulation therapy, transdermal patches, AI-powered personalised treatment, and so on.

DIGITAL MONITORING TECHNOLOGIES

Mobile Apps: Menopausal health apps monitor symptoms such as mood, sleep, and hot flashes, offer insights into patterns, and frequently incorporate educational materials and support groups.

Wearable Technology: Smart watches and fitness trackers help manage menopausal health by monitoring heart rate, sleep, exercise, stress, and providing relaxation advice.

Hormonal Tracking Devices: Monitor hormone levels in saliva or urine to identify menopausalchanges.

Telemedicine platforms: Provide convenient and accessible remote consultations and symptom management. With the assistance of professionals, these technologies enable women to actively manage menopause, comprehend symptoms, and make educated decisions about their treatment.

CONCLUSION:

Addressing bone health in menopausal women necessitates a revolutionary and transformative approach that combines scientific research, technology, nursing care, and medical interventions. Early identification of risk factors, as well as the implementation of innovative, comprehensive interventions, can dramatically improve menopausal women's bone health and quality of life. Strengthening awareness, preventive care, and nursing-led initiatives is critical for supporting healthy ageing in women to enhance the quality of life the women. The future is revealed by the Stellarix consulting firm, which is also real. As a result of growing scientific research and data sets, we anticipate many more good knock-on consequences, including a future that is more empathetic to women during this important time and treated more seriously. Significant improvements in treatment options, support services, and general knowledge of menopausal symptoms and their effects on women's health are anticipated in the future of menopause healthcare. Healthcare professionals may now customise menopausal symptom treatment programs based on a woman's health profile, genetic predispositions, and particular symptoms thanks to the advancement of precision medicine. More access to telemedicine services and remote monitoring tools could be part of the future of menopause healthcare, allowing women access to specialised care and support regardless of the location they live.

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