

Vitamin C Administration in Breast Cancer After Surgery Treatment: A Review

Rio Aditya Kurniawan

General Practitioner, Suradadi Regional Public Hospital, Tegal, Indonesia

ABSTRACT

Introduction: Breast cancer is still the most common type of cancer, and surgery is still an alternative available. Postoperative care for breast cancer is an action that must be evaluated from a variety of perspectives.

Methods: The information retrieval feature of the PubMed and Cambridge Core literature search engines was used to find review of literature articles for this journal. The periodicals on which the literature was predicated were obtained.

Result Vitamin C has various functions in cases of breast cancer. A special review in this paper is in terms of wound healing and anti-pain modulation in postoperative breast cancer. The existence of this is considered significant and can be used as postoperative therapy.

Conclusion: Vitamin C involvement in postoperative therapy for breast cancer is expected to have benefits in terms of wound healing as well as modulation of anti-pain interventions. Furthermore, vitamin C therapy is not permitted as an adjunctive treatment or to lower the risk of breast cancer or to inhibit post-surgical complications within those cases

KEY WORDS: ascorbic acid, breast carcinoma, post-surgery, complication, wound healing

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INTRODUCTION

Breast cancer occupies the highest place in terms of concern in terms of cancer. Breast cancer is indeed the world's second most common cancer, with the greatest incidence rate of any type of cancer.^{1,2} A postponement in accessing treatment is linked to a diminished survival probability.² Prominently, there is a considerable variation in five-year survival rates around the world; for example, in the developed world, the five-year survival rate reaches 83.2%, whereas in developing countries like Brazil and India, it settles at 58% and 52.1%, which is between.^{3,4} Breast cancer ranks as the most prevalent cancer in Indonesia, accounting for 19.2% of any and all cancers.⁵ Throughout 1992, the majority of women with breast cancer (60-70%) went for therapy once their cancers had been in later phases (stage III and IV).⁶ Three decades later, data collected from many teaching hospitals in Indonesia demonstrate that 68- 73% of patients with breast cancer present to healthcare institutions in the final stages.⁷⁻⁹ Recently, the use of multivitamins in cancer cases has been the focus of therapeutic interventions. Aside from the simplicity with which these drugs can be obtained, several

studies have shown that they have an impact on the progression of the cancer.

Many breast cancer patients currently use alternative as well as complementary treatments and nutritional supplements, along with antioxidants such as vitamin C. The usage of alternate and complementary medicines and nutritional supplements, including antioxidants like vitamin C have a good outcomes.^{10,11} Interactions with other medications and nutritional supplements, including vitamins, may affect the effectiveness of such therapeutic interventions.¹² Numerous multivitamins have powerful antioxidants,¹³ that may interfere with chemotherapy and radiation therapy.¹⁴ Antioxidant compounds may interact with radiation therapy efficacy because the major treatment impact of radiation occurs through the generation of reactive oxygen species.¹⁵ Concurrent use of (nutritional) antioxidant properties, including vitamin C, with radiation therapy or chemotherapy reduced the treatment's effectiveness; thus, patients may be informed it against.¹⁴ Further research into the possibility of clinically relevant connections among both vitamin C and radiation therapy is required. Chronic wound, seroma forming, hematoma, and flap necrotizing are examples of

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postoperative complications that can be identified early.^{4,16} Common late complications include shoulder stiffness, brachial plexopathy, and psychosocial disturbances.¹⁷⁻¹⁹ Regrettably, numerous factors that increase the likelihood of surgical patients are unalterable during early assessment and eventual surgical intervention.²⁰ The application of vitamin C in the treatment after surgery is a potential, especially in breast cancer. Postoperative ascorbic acid (AA) doses in plasma are common, but usually return to normal within 5-8 days.²¹⁻²³ When applied in combination with said initiation of adverse outcomes, the level of AA is further reduced, and thus Borrelli et al. linked AA insufficiency towards the hazard of postoperative complications.²⁴ Throughout addition to the known effects of AA on tissue- or ischemia-reperfusion injury, immunity, etc., post-operative antioxidant AA fortification can be found to be beneficial. An effective replacement arrangement, which is currently unavailable, is needed to explore this even further. This would be due to a lack of knowledge on how to quickly try substituting AA to normal serum values in postoperative patients.²⁵⁻²⁸ In this review, we will describe the use of vitamin C in after surgery treatment

METHODS

The purpose of this review was to compile various types of literature on vitamin C and post-surgery treatment. A positive link between vitamin C and post-surgery treatment for breast cancer. The following keywords were used to find relevant articles: ((vitamin c) OR (ascorbic acid)) AND (after surgery) AND (breast cancer)). The search engine using PubMed, Google Scholar and Cambridge Core. This study's materials were all written in English. Since the review of understanding is still comparatively small, the author did not restrict the years accepted for publication or the study design. The title and abstract of each article served also as reviewers' foundation for evaluation. Those who did not meet the criteria were ejected.

DISCUSSION

The administration of vitamin C, particularly in postoperative cases, can be investigated from different aspects that are essential for research. The majority of postoperative breast cancer patients will unarguably experience discomfort which the patient considers disturbing. A present study, being the inaugural effort to comprehensively examine vitamin C's pain-relieving efficacy against postoperative pain, also had many significant clinical potential ramifications. Hung et al. demonstrated that vitamin C was linked to a lower level of pain at postoperative 1-2, 6, and 24 h along with a greatly reduced morphine necessity for up to postoperative 48 h. Furthermore, regardless of the absence of a major distinction between the two groups 24 after the procedure, the occurrence of postoperative vomiting or nausea was lowered at 1-2 hours after surgery. However a prior study found that did not observe a difference in haemorrhage between both the

vitamin and placebo groups.²⁹ A previous research has found a link between the severity of acute postsurgical pain and the risk of developing chronic pain.³⁰ Nonetheless, finding the right compromise among managing postoperative pain and minimizing analgesic-associated adverse effects remains a challenging issue for physicians. As a result, notwithstanding the demonstrated efficacy of opioids as well as other prevalent analgesics in the treatment of postoperative pain, insufficient pain medication was pervasive due to unfavorable adverse effects.³¹ As a result, contemporary guidelines for clinical practice advocate a multidisciplinary approach to analgesia, which includes employing numerous analgesic medications and methods in conjunction with non-pharmacological treatments. Nonsteroidal anti-inflammatory drugs (NSAIDs) constitute one of the most commonly used adjuvants to opioid-based analgesia, but they are as well linked to undesirable adverse reactions.³¹⁻³⁴ Vitamin C, a water-soluble vitamin, does have a relatively low acute toxicity, with depositions in bloodstream quickly eliminated through urine. As a result, vitamin C may be a good potential adjuvant to traditional analgesics.^{29,35}

Through terms of neuromodulation, there is substantiation that vitamin C's antinociceptive property is due towards its activity upon that N-methyl-D-aspartate (NMDA) receptor. Prior studies not just to proved that vitamin C might attenuate glutamate and dopamine neurotransmission by changing redox adjustments on the NMDA receptor, additionally it proven that vitamin C found to exert an antinociceptive effect in induced animal pain designs, potentially through inhibitory activity of the ionotropic NMDA receptor.^{36,37} Moreover, vitamin C is required for the biosynthetic pathway of neurotransmitters that have been identified as key elements of the inhibitory pain pathway.³⁸ Vitamin C is a substance of an enzymatic dopamine beta-hydroxylase, which converts dopamine to norepinephrine.^{39,40} Vitamin C as well has a significance in cholinergic and GABAergic transmitted.⁴¹ Therapeutically, even though surgical intervention is recognized as causing oxidative stress, which would be associated with a decrease in postoperative serum vitamin C level. A prior review indicates reducing the oxygen radicals burden between many surgical patients by supplementing with vitamin C to enhance its systemic circulation level.⁴² A further research study discovered that individuals with neuropathic pain who had a low plasma concentration of vitamin C had a lowering in unexpected but just not brush-evoked pain within a week of intravenous infusion of vitamin C at 50 mg/kg with a highest concentration of 2.5 g/day on alternate days for three doses.⁴² Vitamin C is essential for platelet aggregation and the preventative measures of platelet depletion during the haemostatic phase.⁴³ Because of impeded vascular integrity resulting from incorrect collagen formation, unexpected bleeding has indeed been observed in individuals with plasma vitamin C concentration levels below 0.6 mg/dL. As a result, vitamin C deficiency should indeed be considered as a differential diagnosis for postoperative

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pain with nonspecific hemorrhage, particularly those who have serious diseases, prolonged hospital stays, and poor dietary intake, which have all been linked to vitamin C deficiency.^{29,44}

Vitamin C has a high potential in instances of breast cancer. Numerous research findings have looked at the relationship among both antioxidant properties as well as the occurrence or progression of breast cancer.⁴⁵⁻⁵⁰ It is generally recognized that Vitamin C ranks as one of the most prevalent antioxidants that are present in vegetables and fruits, as well as its chemoprotective properties.⁵¹ Whereas preceding two meta-analyses suggested that Vitamin C daily consumption can decrease the likelihood of breast cancer mortality and incidence,^{47,48} several other research findings, along with a randomized clinical trial, did not identify a connection between nutritional or supplemental vitamin C daily consumption and breast cancer.⁵²⁻⁵⁴ Throughout way of comparison, a latest research study discovered that taking a vitamin C supplement raised the probability of breast cancer occurrences and fatality. As a result, the actual impact of vitamin C consumed on breast cancer risk and continued existence remains an open question.^{11,55}

A greatest versus least vitamin C daily consumption was linked to a lower risk of breast cancer. There was no considerable dose-dependent relationship between higher vitamin C intake and lower breast cancer risk. Throughout case-control studies, geographic regions in Asia, and premenopausal women, opposite affiliations were also discovered. Nevertheless, taking supplements containing vitamin C had no significant anti breast cancer effects. Reducing risk of breast cancer thing causing death rates, total mortality, and sudden onset with higher vitamin C intake versus lower intake. Throughout comparison to other studies, ours had a larger sample size, allowing us to draw more reliable conclusions about the relationship among vitamin C consumption and breast cancer risk and death rates.⁵⁵

Postoperative wounds from breast cancer surgery will necessitate recovery. Furthermore, vitamin C has an advantageous impact on wound healing. Wound restoration is a complicated process which thus necessitates the collaboration of numerous local biochemical and cellular events.⁵⁶ Vast majority of research has used oral supplementation to increase vitamin C levels in plasma and tissues. Current findings by Padayatty and colleagues, among others, has demonstrated that oral supplementation fails to deliver the necessary Vitamin C levels to restore plasma amount of vitamin C needed.^{57,58} Furthermore, scorbutic people have slower healing and lower interest rates of collagen synthesis and development.⁵⁹ Vitamin C serves as a vital co - factor for several enzyme systems and it has lately been demonstrated to repress pro-inflammatory mechanisms via pleiotropic pathways whilst also promoting anti-inflammatory as well as pro-resolution impacts in macrophages.⁶⁰⁻⁶²

Because vitamin C also was engaged in collagen metabolism and regulatory oversight, numerous investigations have concentrated all over its contribution in healing process.⁶³⁻⁶⁶ Humans lack usable L-gulonolactone oxidase (Gulo -/-), the final enzyme in vitamin C biosynthetic pathways, and thus rely on an external supply (via diet).⁶⁷ Wounds and injuries in general are linked to accelerated micronutrients.⁶⁸ Vitamin C amounts have been demonstrated that they fall sharply (60-70%) at the wound site and do not fully recover also after 14 days post-wounding.^{69,70} The above findings could be attributed to vitamin C depletion caused by the abundance of free oxidant radicals produced in the wound microenvironment, as well as increased consumption of vitamin C in multiple biological processes (e.g. collagen synthesis) which are activated during in the healing period. While higher oral intake is possible, reaching significant plasma levels is hampered by gastric intolerance, as well as uptake and renal excretion tolerances. Intravenous fluid vitamin C is advantageous in overcoming these constraints and producing and maintain appropriate plasma levels.^{61,70} Mohammed et al. discovered that Gulo(-/-) mice had enhanced wound healing characteristic features with vitamin C sufficiency as well as parenteral vitamin C repletion.⁵⁶ Parenteral Vitamin C management is both secure and efficient in intensive care circumstances in the both human and mouse models. Furthermore, when administrated parenterally, the above Vitamin C doses have been adequate to reinstate flowing plasma Vitamin C levels. A current study provides new evidence that, in addition to its well-known role in collagen metabolism, Vitamin C plays a critical role in instigating numerous wound-healing processes. Parenteral vitamin C injection has the possibilities to serve as a secure and affordable treatment for improving tissue repair and reducing recovery process.⁵⁶

CONCLUSION

The role of vitamin C in postoperative therapy for breast cancer is projected to have advantages including both terms of wound healing and modulation of anti-pain interventions. Furthermore, in these cases, vitamin C therapy cannot be used as adjunctive treatment or to reduce the risk of breast cancer as well as to prevent post-surgical complications. Further research on this topic is highly recommended due to a lack of related scientific evidence that can prove a stronger link between vitamin C and improved post-surgical conditions in breast cancer cases.

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