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The Impact of Real and Artificial Plants on the Patient Experience in the Hospital Setting

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Abstract

Background: Psychological stress and inadequately controlled pain can have a negative effect on wound healing and patient comfort. Prolonged hospital stays and the use of analgesics and anesthetics for anxiety and pain may contribute to increased patient cost and can cause adverse events. Individuals recover more quickly from stress and report less physical discomfort when exposed to a natural environment. Patients with views of nature have been shown to have faster recovery from surgery, and those exposed to a garden environment demonstrate less pain and emotional distress during hospitalization. In this setting, it is prudent to consider: what are the effects of real or artificial plants on the patient experience in a hospital setting?

Methods: An exhaustive search was conducted using Medline-Ovid, CINAHL, Web of Science, and Medline-PubMed using the key words: *plants, houseplants, nature, hospital, patient rooms, hospital rooms, stress, anxiety, recovery,* and *pain*. Included studies were assessed using the GRADE criteria.

Results: Four studies were identified meeting search criteria. A randomized clinical trial (RCT) of 90 appendectomy patients assigned to rooms with or without plants found that patients exposed to plants during recovery demonstrated lower anxiety and pain ratings, and reported higher satisfaction with the hospital environment. A second RCT of 80 thyroidectomy patients showed shorter hospitalizations, reduced analgesic intake, higher environment satisfaction, and lower anxiety and pain ratings in patients who viewed plants during recovery. A third study, a RCT of 90 hemorrhoidectomy patients, demonstrated significantly reduced anxiety and pain ratings in patients who had plants placed in their hospital rooms during recovery, with patients rating their rooms as more comfortable. A fourth clinical trial demonstrated lower anxiety rates in patients waiting for imaging studies when plants, either real or images as posters, were present in the waiting rooms. In addition, these patients rated these rooms as more attractive.

Conclusion: The presence of plants in the hospital setting has been shown to reduce patient stress and pain, as well as provide a more satisfying healthcare environment. Patients reported lower levels of anxiety, pain intensity, and pain distress when viewing plants. Rooms containing plants were rated as more attractive, comforting, and satisfying. The addition of live or artificial foliage provides a cost-effective and safe method to improve patient experiences in a hospital setting.

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Biography

Cindy Fulton is a native of Portland, Oregon. She received a Bachelor of Science degree from Linfield College in McMinnville, Oregon, where she majored in Biology. Prior to PA school, she worked for 4 years in refractive surgery as a clinical and surgical technician. She is interested in a career in Cardiology and Internal Medicine.

Abstract

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Keywords: hospital, patient experience, plants

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To my family and friends, thank you for the support you've given me throughout this journey.

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List of Abbreviations

EAS……...Environmental Assessment Scale
NRS.....Numerical Rating Scale
POD……..……..Post-Operative Day
PPAF…….Pain intensity, Pain distress, Anxiety and Fatigue Scale
PRSQ……..……..Patient Room Satisfaction Questionnaire
STAI-Y1……..State Trait Anxiety Inventory Form Y1
STAI-6…….....……...State Trait Anxiety Inventory-6

The Impact of Real and Artificial Plants on Patient Experience in the Hospital Setting

BACKGROUND

The healthcare setting can be a stress-inducing environment, with many patients experiencing feelings of anxiety, uncertainty, and fear during hospital visits.[1,2] Psychological stress and anxiety have been shown to have a negative impact on wound healing, resulting in a delayed inflammatory response and wound closure.[3,4] Stress can increase the production of the hormone cortisol, which, if maintained at high levels, can impede healing.[5,6] Inadequately controlled or irrepressible pain can add to a patient's level of stress, thereby affecting both their psychological well-being and physiological ability to heal.[7]

Individuals recover more quickly from stress and experience reduced physical discomfort when exposed to a natural environment.[8,9] A well-known study previously demonstrated the benefits for hospitalized patients when they were provided with a view of nature during surgical recovery.[10] These results included shorter postoperative stays and the use of fewer analgesic doses. More attention has recently been focused on psychologically-supportive healthcare environments,[11] with the idea that built healthcare settings can impact the health and well-being of patients. This includes the theory of physical environment effecting how quickly a patient adapts to or recovers from a condition.[12] Recent research has focused on the design of hospital gardens and green spaces, and their positive impact on patient's experiences.[13] Research has shown patients report less pain and emotional distress when exposed to a garden environment.[14]

Prolonged hospital stays and the use of analgesics and anesthetics for pain and anxiety may contribute to increased patient cost and risk. Narcotic and non-narcotic analgesics may have potentially serious side-effects.[15] Longer hospital stays can result in increased cost to the patient, as well as an increased risk of infection.[16] Therefore, alternative therapies for reducing patient pain and stress should be investigated, including those interventions that may improve a patient's satisfaction with their hospital environment. As the presence of hospital gardens and nature views have demonstrated beneficial effects, it is prudent to also consider the possible impact of live or artificial plants in the hospital setting.

METHODS

An exhaustive search of the literature was conducted using Medline-Ovid, CINAHL, Web of Science and Medline-PubMed. The following key words were used: *plants, houseplants, nature, hospital, patient rooms, hospital rooms, stress, anxiety, recovery,* and *pain*. The search was narrowed to include only those studies published in English, using either live or artificial plants, with humans as study subjects, and in a hospital setting. Those studies involving a simulated patient experience were excluded, as were any studies that failed to utilize randomization. The bibliographies of the articles were reviewed for any additional sources of information. Relevant studies were appraised using the Grades of Recommendation, Assessment, Development, and Evaluation (GRADE)[17] system.

RESULTS

A total of nine studies were identified during the initial search, with four studies meeting inclusion guidelines after being screened for the aforementioned criteria. These four articles were all randomized control trials.[18-21] See Table I.

Effects of Flowering and Foliage Plants in Hospital Rooms on Patients Recovering from Abdominal Surgery

This randomized clinical trial[18] involved 90 appendectomy patients in a suburban Korean hospital assigned to rooms either with or without live plants. Enrolled in the study were both male and female patients aged 21-60 years, with no major chronic (eg, diabetes or hypertension) or acute (eg, upper respiratory infection) health conditions, history of psychiatric problems (eg, depression or anxiety), or uncorrected hearing or visual impairments. Patients were randomly assigned to a room either containing 12 potted flowering and foliage plants, placed after the patient was taken for surgery, or to a control room with no plants. Patients remained allocated to these rooms for the duration of their hospital stay. Subjects were not told of the study objectives or given instructions on how to interact with the plants.[18]

Data collected on each patient consisted of: length of hospitalization, vital signs, analgesics used for post-operative pain control, ratings of pain intensity, pain distress, anxiety and fatigue, an environmental assessment, and a room satisfaction questionnaire. Vital signs were defined as the average of three readings taken each day, with measurements including systolic and diastolic blood pressure, body temperature, and heart and respiratory rate. Analgesics were classed as weak, moderate, or strong. The weak category was comprised primarily of diclofenac sodium injections up to $75mg \cdot d^{-1}$,

while the moderate category included large amounts of diclofenac sodium injections up to 150mg·d^{-1}. The strong category consisted of pethidine hydrochloride injections, a narcotic analgesic. Patients rated levels of pain intensity, pain distress, anxiety, and fatigue (PPAF) using a 101-point numerical rating scale (NRS-101). They also completed the State-Trait Anxiety Inventory Form Y-1 (STAI-Y1), a modified Environmental Assessment Scale (EAS), and the Patient's Rooms Satisfaction Questionnaire (PRSQ). The STAI-Y1 scale contains 20 statements designed to measure state anxiety, or anxiety about an event. The EAS consisted of 13 adjective pair semantic differential scales. The PRSQ asked patients to identify three positive and three negative qualities of their hospital room environment. Patients were also asked to indicate their willingness to return to the room for any future hospitalizations. The PPAF, STAI-Y1 and EAS were administered to the patients at admission, prior to surgery. The PPAF and STAI-Y1 were re-administered at midmorning on each of the first three days following surgery. The EAS was re-administered on the last day of hospitalization, along with the initial trial of the PRSQ.[18]

Patients in the plant group experienced a statistically significant reduction in anxiety, pain intensity, pain distress, and the amount of analgesics used. Those in the experimental group had lower levels of anxiety for the duration of the recovery period. Using the STAI-Y1 and PPAF scales, the plant group reported significantly lower anxiety ratings on PODs 1 through 3 ($P = 0.01$). Self-rated pain intensity and pain distress were also significantly reduced for the plant group on POD 3 ($P = 0.01$, $P = 0.01$, respectively). The patients in the experimental group had a reduced use of post-operative analgesics on

POD 3, with patients in this group less frequently administered weak and moderate analgesics.[18]

The EAS and PRSQ responses demonstrated significant differences between the plant and control groups. Seven items on the EAS were identified as showing differences, with those in the plant group rating their rooms as more satisfying, relaxing, colorful, pleasant-smelling, calming, and attractive. The PRSQ results showed that most patients in the experimental group responded that plants were the most positive aspect of their rooms, with those in the control group indicating that watching television was the most positive quality of their rooms. Finally, when asked about their willingness to return to their room for any future hospital stay, 91% of patients in the plant group responded favorably, while only 71% of patients in the control group indicated a willingness to return. [18]

While lower systolic blood pressure readings were noted in the plant group on POD 0 and 1, no other significant differences in vital signs were noted. There was also no statistically significant difference in mean length of hospitalization between the two groups. [18]

Therapeutic Influences of Plants in Hospital Rooms on Surgical Recovery

Involving 80 female thyroidectomy patients, this random clinical trial[19] assigned patients to hospital rooms either with or without plants for the duration of their post-operative recovery. Patients were located at a university-affiliated hospital in Korea, and both single and six-patient rooms were used for both treatments. Patients were excluded from the study if they were younger than 19 years, older than 60 years, or reported a chronic (eg, diabetes) or acute (eg, upper respiratory infection) health condition,

psychiatric problem (eg, anxiety) or uncorrected hearing or vision problems. Data collected included vital signs, length of hospitalization, analgesics used, and ratings of pain intensity, pain distress, anxiety, and fatigue (PPAF questionnaire). Anxiety was also measured using the STAI-Y1 form. The EAS and PRSQ were given to patients to help assess environment and room satisfaction. Vital signs included systolic and diastolic blood pressure, heart rate, respiratory rate, and body temperature.[19]

Vital signs were determined as the average of three readings taken each day. Analgesics were classed as weak, moderate, or strong. The weak category was comprised primarily of diclofenac sodium injections up to 75mg·d^{-1}, with the moderate category including large amounts of diclofenac sodium injections up to 150mg·d^{-1}. The strong category consisted of pethidine hydrochloride injections, a narcotic analgesic. The PPAF, STAI-Y1 and EAS were administered to the patients at admission, prior to surgery. The PPAF and STAI-Y1 were re-administered at midmorning on POD 1, 3, and 5. The EAS was re-administered on the last day of hospitalization, along with the initial trial of the PRSQ. [19]

Several significant differences were noted between the plant and control groups in the length of hospital stay, anxiety, pain intensity and pain distress ratings, and the use of post-operative analgesics. Hospital stays for patients in the plant group averaged 6.08 days, compared with 6.39 days in the control group ($P = 0.034$)[19]. Anxiety levels were rated lower in the plant group on the PPAF scale for the duration of the post-operative period ($P < 0.05$, compared with control). On the STAI-Y1, anxiety was also reported lower in the plant group throughout the recovery period ($P = 0.01$). Pain intensity and pain distress were significantly lower in the experimental group for POD 3 and 5 ($P =$

0.012, P = 0.01, respectively). Less analgesics were utilized by the plant group on POD 4 and 5, with these patients less frequently being given weak and moderate strength analgesics (P = 0.04).[19]

Significant differences between the plant and control groups were seen in the EAS and PRSQ responses. The EAS identified eight items showing differences, with those in the plant group rating their rooms as more satisfying, relaxing, comfortable, colorful, happy, pleasant-smelling, calming, and attractive. The PRSQ results showed that plants were rated the most positive aspect of the rooms for patients in the experimental group, while watching television was the most positive quality of the rooms in the control group. 93% of patients in the plant group responded favorably when asked about willingness to return to their room for future hospitalizations, in comparison to only 70% of patients in the control group. There were no statistically significant differences in vital signs between the two groups.[19]

Ornamental Indoor Plants in Hospital Rooms Enhanced Outcomes of Patients Recovering from Surgery

This clinical trial[20] involved 90 male and female hemorrhoidectomy patients in a suburban hospital in Korea, randomly assigned to hospital rooms either with or without plants. Excluded from the study were those patients younger than 19 years, older than 60 years, or reporting a chronic (eg, diabetes) or acute (eg, upper respiratory infection) health condition, psychiatric problem (eg, anxiety), or uncorrected hearing or vision problems. Data collected consisted of vital signs, length of hospitalization, analgesics used, and ratings of pain intensity, pain distress, anxiety, and fatigue (PPAF questionnaire). Anxiety was also measured using the STAI-Y1 form. The EAS and PRSQ

were given to patients to help assess environment and room satisfaction. Vital signs, averaged from three daily readings, included systolic and diastolic blood pressure, heart rate, respiratory rate, and body temperature. Analgesics were classed as weak, moderate, or strong. The weak category consisted primarily of diclofenac sodium injections up to $75mg \cdot d^{-1}$, with the moderate category including diclofenac sodium injections up to $150mg \cdot d^{-1}$. The strong category contained the narcotic analgesic pethidine hydrochloride injections. At admission, the PPAF, STAI-Y1, and EAS were administered to the patients, prior to surgery. The STAI-Y1 and PPAF were re-administered after surgery and at POD 1 and 2. The second trial of the EAS and the initial trial of the PRSQ were re-administered on the last day of hospitalization.[20]

Between the two groups, several significant differences were noted, including lower ratings of anxiety and pain in the plant group. Pain intensity was rated significantly lower on the PPAF on POD 1 and 2 by the plant group ($P = 0.04$ and $P = 0.02$, respectively), and pain distress was lower than the control group on POD 2 ($P = 0.02$).[20] Anxiety was rated lower on the PPAF and STAI-Y1 scales for those in plant group ($P = 0.03$ and $P = 0.02$, respectively), on the day of surgery, as well as POD 1 and 2. Between the plant and control groups, significant differences were seen in the EAS and PRSQ responses. [20]

Eight items showed differences on the EAS, with those in the plant group rating their rooms as more satisfying, clean, relaxing, comfortable, colorful, happy, calming, and attractive. In the plant group, the PRSQ results showed that plants were rated the most positive aspect of the rooms (96%), while those in the control group rated appropriate temperature as the most positive quality of their rooms (88%). When asked

about willingness to return to their room for future hospitalizations 93% of patients in the plant group responded favorably, in comparison to only 73% of patients in the control group. [20]

There were no statistically significant differences in length of hospitalization or analgesic intake between the two groups. Systolic blood pressure was significantly lower in the plant group on POD 1, otherwise, no differences were noted in vital signs between the groups. [20]

Stress-Reducing Effects of Real and Artificial Nature in a Hospital Waiting Room

This clinical trial[21] involved patients in the waiting areas of a Dutch radiology department exposed either to plants, pictures of plants, or no plant materials during their waits. These patients were undergoing imaging studies, including echocardiograms, MRIs, CTs, and nuclear research. Two waiting rooms were utilized; in room A patients were awaiting nuclear research, while in room B they were awaiting x-ray research. Over the course of 3 weeks, different situations were applied to the two rooms, alternating between real plants, posters of plants, or a control situation in which no plants were visible. Patients were asked to complete a questionnaire during their waits that asked patients to rate the attractiveness of the room on a 10-point bipolar adjective scale, including descriptions such as "pleasant-unpleasant" and "friendly-unfriendly." Anxiety level was measured using five items from the Profile of Mood States and six items from the Dutch and State Trait Anxiety Inventory (STAI-6). All items were measured on a five-point scale. Finally, baseline characteristics of each patient were determined, with patients answering questions about the number of previous visits to the same facility, how much trust they had in the hospital, the type of treatment they were awaiting, the number

of times the patient had undergone the current treatment before, whether the patient had family or friends present with them, and a general health rating of the patient.[21]

A total of 748 questionnaires were distributed, with 457 completed and returned. Gender and age were equally distributed between the three groups (plants, posters of plants, and no plants). No differences were seen in the number of previous visits, trust in the hospital, number of previous treatments, current health status, or presence of friends or family. Therefore, no systematic differences were noted between the various exposure groups. [21]

Significantly lower levels of stress were reported by patients in both the real plants (mean 2.27) and posters of plants (mean 2.27) groups when compared to the control group (mean 2.51) ($P = 0.04$ and $P = 0.04$, respectively).[21] No difference was seen between the real plants or posters group ($P = 1.00$). Stress was over-all higher in those patients in room A (nuclear research, mean 2.49) compared to those in room B (x-ray research, mean 2.33), although this difference was non-significant ($P = 0.14$). Those waiting rooms containing live plants or posters of plants were rated as significantly more attractive compared to the control condition ($p = 0.003$ and $p = 0.000$, respectively). No difference was found between either real plants or posters ($p = 0.84$). Finally, the rated attractiveness of the room showed a correlation with the level of stress, with the higher the level of attractiveness, the lower the level of reported stress. The authors used Preacher and Hayes's method to test for indirect causal effects, and determined that a significant aspect of the stress-reducing effect of real plants and posters was due to the perceived attractiveness of the room. [21]

DISCUSSION

The utilization of natural landscapes and views in the hospital setting has demonstrated positive impacts on patient's experiences, including faster recovery from stress[10] and reduced pain and emotional distress.[14] Recently, more attention has been focused on creating patient-friendly hospital spaces that incorporate changes in lighting, color, and patient privacy to enhance a non-institutional aesthetic.[22,23] The placement of plants in patient areas is not a widely accepted practice, despite the lack of evidence to suggest a significant infection risk to patients.[24,25]

Clinical trials have demonstrated a statistically significant reduction in patient anxiety when plants are added to the hospital environment.[18-21] This was seen both with post-operative surgical patients, as well as with patients waiting for imaging studies in a hospital radiology department. The effect on anxiety was modest: a 10% reduction in the waiting room trial using the STAI-6 scale, and mean score reductions on the STAI-Y1 of 3.7%, 2.1%, and 2.4% in the hemorrhoidectomy, thyroidectomy, and appendectomy trials, respectively. The three trials involving surgical patients also demonstrated small but significant reductions in anxiety on the PPAF scales throughout the course of the post-operative period. These findings suggest that the practice of placing either live or artificial plants in patient areas can effectively reduce the negative psychological feelings of patients.

Lower stress levels may lead to faster healing times, with the potential for shorter hospitalizations. Thyroidectomy patients assigned to rooms containing plants experienced significantly less post-operative anxiety and shorter hospital stays (6.08 days vs 6.39 days in the control group), although a causal relationship for this was not determined. There

also exists the potential for reduced costs to the patient and/or the patient's insurer with shorter hospitalizations.

Satisfaction with the healthcare environment was rated higher when patients viewed plants during their hospital experience. In the Beukeboom et al study,[21] patients rated waiting rooms containing either live or posters of plants as significantly more attractive. In this study,[21] a correlation was demonstrated between higher ratings of room attractiveness and lower ratings of patient anxiety. In the three Park and Mattson studies,[18-20] rooms with plants were consistently viewed as more satisfying, relaxing, and comfortable. The PRSQ administered to patients in these three studies demonstrated that in plant rooms, the plants were rated as the most positive aspect in the rooms. Those in the plant group were also more willing to return to their rooms for any future hospitalizations (93% vs 73% in the hemorrhoidectomy study, 93% vs 70% in the thyroidectomy study, and 91% vs 71% in the appendectomy study). Patients who are comfortable are more likely to show better response or effort to therapy and faster healing.[26] In addition to the attention paid to wall colors and the availability of a view, consideration should also be given to placing plants in patient areas in the effort in increase patient comfort and psychological well-being.

Post-surgical patients exposed to live plants in their hospital rooms reported lower levels of both pain intensity and pain distress, as well as reduced analgesic intake. Park and Mattson identified lower pain ratings on the PPAF scale in the plant groups in all three of their studies, [18-20] with differences between the groups varying in significance by the individual day. Exposure to plants during the post-operative recovery period has also been shown to correlate with decreased intake of analgesics (see Figures 1, 2, and 3).

This reduction was only seen in analgesics classed as “weak’ or “moderate” strength, with no change observed in the intake of medication classed as “strong.” In post-operative patients, it has been observed that higher pain scores correlate to lower activity levels and post-surgical satisfaction scores.[27] Analgesics used to treat pain, including narcotics and opioids, may induce adverse drug reactions such as sedation, nausea and vomiting, and constipation, which may further impair patient recovery and decrease patient comfort. The lower amount of analgesics used by patients exposed to plants during recovery indicates the possibility of plants acting as effective non-pharmacologic analgesia.

Although the studies reviewed indicate a significant impact of live and artificial plants on patient experiences in the hospital environment, several limitations were identified for each. In the Park and Mattson clinical trials,[18-20] patients were blinded to the intent of the study, but potential bias was introduced in that the nursing staff was aware of the study goals, as were those determining patient outcomes. Furthermore, patients assigned to the plant groups were able to view their rooms without plants prior to their surgery, as plants were not placed until after patients were taken to the operating room. This may have negated, at least in part, the attempt to blind patients to the trial intent.

The Beukeboom trial[21] involving both real and posters of plants utilized two waiting rooms that differed in size (11 seats in room A versus 28 seats in room B) and in the type of study patients were awaiting (nuclear imaging in room A versus x-ray imaging in room B). Although interventions were alternated between the rooms, patients in room A reported over-all higher levels of anxiety. This difference in experienced stress due to procedure type was determined by the authors to be non-significant, but room size

may have also played a confounding role in patient's experiences. Of 748 questionnaires distributed to patients, 457 were returned, showing a completion rate of only 61%.[21]

None of the reviewed trials sought to identify a cause of patient's anxiety or stress. Anxiety may be sourced from fear of a medical procedure (as in the Beukeboom trial), from stress regarding surgery (as in the Park and Mattson trials), or from a different source. If anxiety is due to a cause separate from a health concern or healthcare facility, the interventions seen in these studies could potentially have less impact on treating stress. Further studies should seek to identify the sources of patient anxiety to better determine if alterations to the hospital surroundings are truly impactful.

None of the included studies sought to survey or identify personality traits in their study populations, or consider the impact of certain personality types on anxiety, pain or environment satisfaction. Although the Park and Mattson studies excluded patients with a history of psychiatric issues, no further consideration has been given for how certain personality types may impact patient experiences.

CONCLUSION

The placement of both live and artificial plants in the healthcare setting has been shown to positively impact patient's experiences. Modest but significant reductions in anxiety have been observed in post-surgical patients and in patients waiting to undergo radiographic imaging when these groups viewed plants while in the hospital setting. Reductions in pain intensity, pain distress, and analgesic use have also been shown in post-operative patients who are exposed to plants during the recovery period. Both live plants and posters of plants are associated with higher environment assessment and room satisfaction ratings. Based on the GRADE criteria, the overall combined quality for the

four included studies is low. Real or artificial plants can be recommended as a low-cost and low-risk addition to patient areas with the goal of improving patient outcomes and satisfaction with their hospital experiences.

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Table I. Characteristics of Reviewed Studies

Quality Assessment								
		Downgrade Criteria					*Quality*	*Importance*
No. of Studies	*Design*	*Limitations*	*Indirectness*	*Imprecision*	*Inconsistency*	*Publication bias likely*		
Patient anxiety level								
4	4 RCTs	Serious limitations[a]	No serious indirectness	Serious imprecision[b]	No serious inconsistencies	No bias likely	Low	Critical
Patient pain level								
3	3 RCTs	Serious limitations[a]	No serious indirectness	Serious imprecision[b]	No serious inconsistencies	No bias likely	Low	Critical
Use of pain medications								
3	3 RCTs	Serious limitations[a]	No serious indirectness	Serious imprecision[b]	No serious inconsistencies	No bias likely	Low	Critical
Patient environmental satisfaction								
4	4 RCTs	Serious limitations[a]	No serious indirectness	Serious imprecision[b]	No serious inconsistencies	No bias likely	Low	Important

[a] No allocation concealment in any study; possible bias introduced by nursing staff and patient in plant group viewing rooms prior to placement of plant in all three Park, S and Mattson, R studies; subjective outcomes used in all for studies
[b] Each of the Park, S & Mattson, R studies had less than 300 subjects each

Figure I. Analgesic Intake in Post-Appendectomy Patients

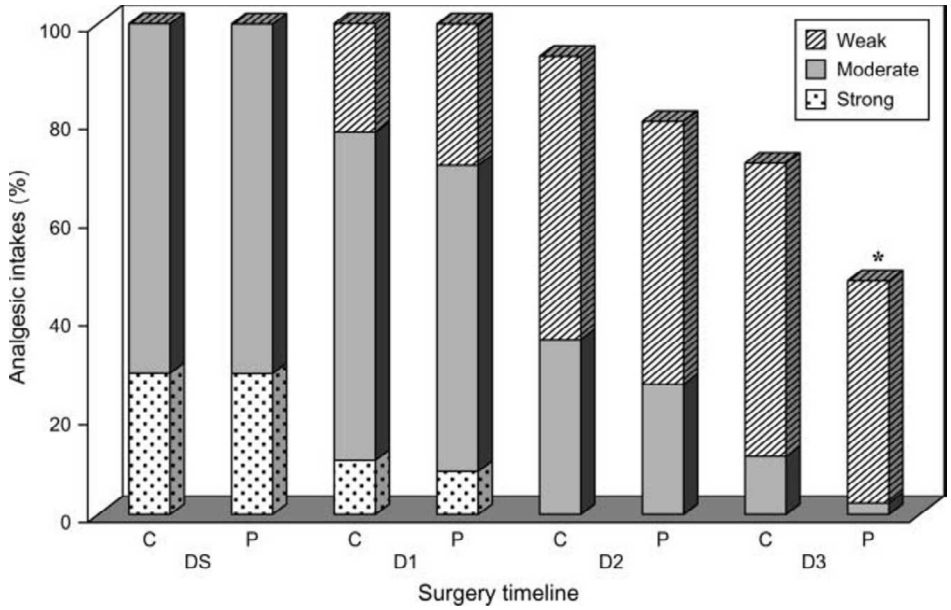

Fig I. Comparison of plant (P) and control (C) groups in post-operative analgesic intake (45 patients per group).[18] Analgesics were classified as weak, moderate and strong. DS, D1, D2, D3 indicate the day of surgery, first day after surgery, second day after surgery and third day after surgery. Some patients did not receive analgesics on D2 or D3, and some had left the hospital on D3. An asterisk indicates significance at $P < 0.05$ (compared with control).

Figure II. Analgesic Intake in Post-Thyroidectomy Patients

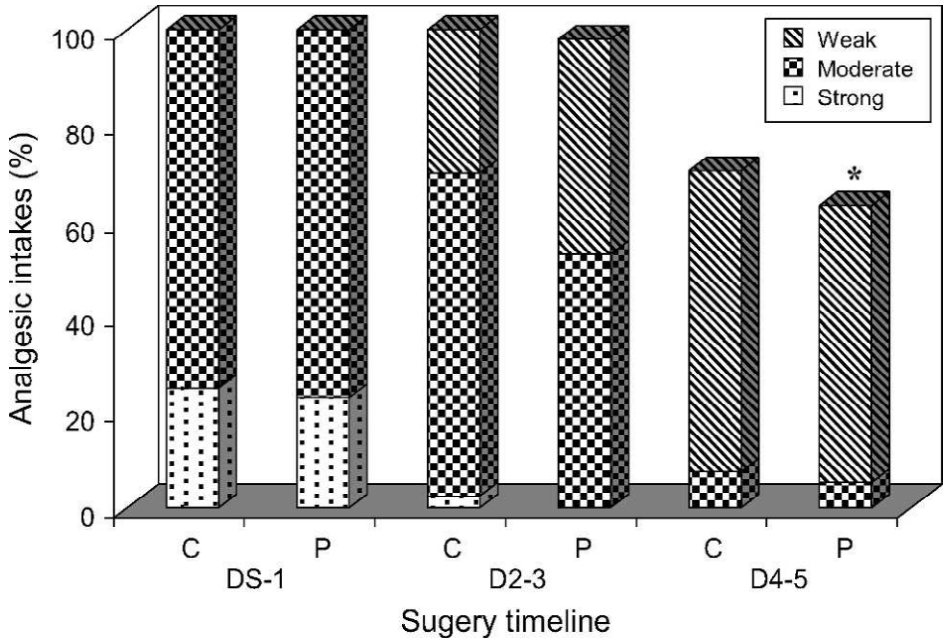

Fig II. Comparison of plant (P) and control (C) groups in post-operative analgesic intake (40 patients per group).[19] Analgesics were classified as weak, moderate and strong. DS-1, D2-3, D4-5 indicate the day of surgery and first day after surgery, second day after surgery through third day after surgery, and fourth day after surgery through fifth day after surgery. Some patients did not receive analgesics on D4-5, and some had left the hospital on D5. An asterisk indicates significance at $P < 0.05$ (compared with control).

Figure 3. Analgesic Intake in Post-Hemorrhoidectomy Patients

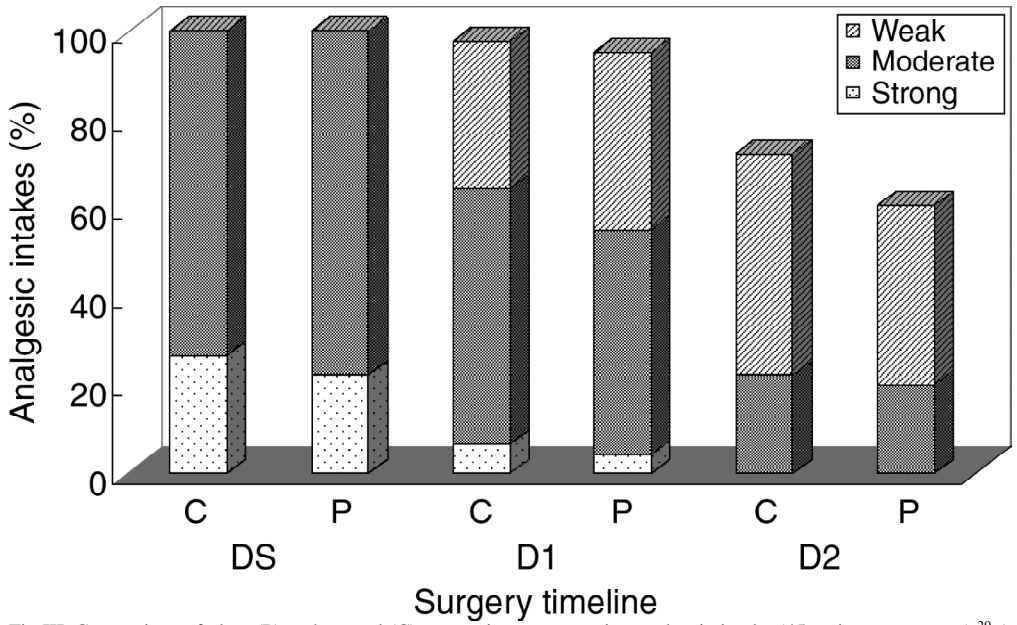

Fig III. Comparison of plant (P) and control (C) groups in post-operative analgesic intake (45 patients per group).[20] Analgesics were classified as weak, moderate and strong. DS, D1, D2 indicate the day of surgery, first day after surgery and second day after surgery. Some patients did not receive analgesics on D2. No significant difference was observed between the two groups.