Global Scientific JOURNALS

GSJ: Volume 10, Issue 11, November 2022, Online: ISSN 2320-9186
www.globalscientificjournal.com

The effectiveness of palliative care services to control cancer pain in King Fahad Medical City

Researchers

1- Dr. Yasir Ahmad Mohammad Agdi (Palliative care fellow)

Main Author

2- Ahmad Ali Rababah (palliative care nurse)

Coauthor

3- Ahoud Alhassan Mujayri (women health fellow)

Coauthor

Supervisor

Dr. Abdullah Ibrahim AL Suhail
Consultant of palliative care medicine
Director of palliative care department in
King Fahad medical city

Dissertation proposal submitted for Saudi fellow in palliative care

1442-2021

List of Contents:

List of abbreviations

Abbreviations	Meaning
CINV	Chemotherapy-Induced Nausea and Vomiting
CNS	Central Nerve System
DNR	Do Not Resuscitate
E.D	Emergency Department
ESAS	The Edmonton Symptom Assessment System
FC	Full Code
I.R.B	Institutional Review Board
IASP	The International Association for the Study of Pain
K.F.M.C	King Fahad Medical City
K.S.A	Kingdom of Saudi Arabia
KPS	Karnofsky Performance Scale
M.O.H	Ministry of health
NSAID	Non-Steroidal Anti-Inflammatory Drug
P.P.S.%	Palliative performance scale%
PCU	Palliative care unit
S.P.S.S	Statistical Package of the Social sciences
SD	Standard Deviation
SOB	Shortness Of Breath
WHO	World Health Organization

Abstract

Background: Despite its ubiquity and the availability of management guidelines, more than 30% of patients with cancer receive inadequate analgesia for pain.

Objectives: This study was aimed to find out the difference between pain intensity in advanced cancer patients before and after receiving palliative in King Fahad Medical City (K.F.M.C) in Riyadh.

Methods: This retrospective study was conducted at palliative care Department of King Fahad Medical City, Riyadh from 2014– 2020.All data of 2952 patients in the data base was taken in this study. This study was conducted upon all patients with advance cancer whom received palliative care service at King Fahd Medical City in study period (2014-2020).

Symptom scores by the Edmonton Symptom Assessment System (ESAS) were collected for patients whom received palliative care service at King Fahd Medical City in study period (2014-2020). Symptoms like nausea, drowsiness, tiredness, lack of appetite, shortness of breath, anxiety, depression and well-beingwere measured. ESAS translated into many languages, validity and reliability tested and showed valid and reliable. The cutoff points of score of the symptoms as following: absent 0, mild (1-3), moderate (4-6) and severe (7-10)

Results: From a total of 2,952 patients, 47% were male and 53% were female. The median age was 57 (range 44 to 68). The most common cancers types diagnosed were gastrointestinal cancer (33.0%), followed by genitourinary cancer (15.7%), breast (10.8%), brain and CNS (9.2%), head and neck cancer (8.7%), lung (6.8%), bone cancer (4.7%) and other cancers (4.7%). While unknown diagnosis was representing (.1%). The mean of Palliative Performance Scale (PPS) not significantly increased at post treatment from (43.35) to (43.93) in pretreatment. The prevalence of the pain among palliative care patients in (K.F.M.C) In accordance to ESAS scale showed significant reduction in terms of pain by 30%,tiredness (fatigue) (25.2%), drowsiness (45.4%) , nausea (57.6%), loss of appetite (40%), shortness of breath (SOB) (46.1%), depression (65%), anxiety (54.9%), wellbeing (35.1%) , constipation (9.9%) and vomiting (81.25%) and insomnia (89.4%) . The top five symptoms (symptom prevalence more or equal 50%) were nausea, depression, anxiety, vomiting and insomnia. There were significant associations between pain intensity with regard to age, gender, dyspnea, anorexia when using PPS and ESAS measurement for evaluation of the effectiveness of palliative care services to control cancer pain.

Conclusions: The Palliative interventions tailored for symptoms to control pain were more prominent in reducing of nausea, depression, anxiety, vomiting and insomnia after 48 hours. Educational interventions about pain and treatment should occur immediately after diagnosis, and pain should be recognized and treated promptly, using one of the available guidelines

.

المستخلص:

الخلفية: على الرغم من انتشاره في كل مكان وتوافر إرشادات العلاج ، فإن أكثر من 30٪ من مرضى السرطان يتلقون مسكنات غير كافية للألم .

الأهداف: هدفت هذه الدراسة إلى معرفة الفرق بين شدة الألم لدى مرضى السرطان المتقدمين قبل وبعد تلقي المسكنات في مدينة الملك فهد الطبية بالرياض .

الطريقة: أجريت هذه الدراسة بأثر رجعي في قسم الرعاية التلطيفية في مدينة الملك فهد الطبية بالرياض في الفترة من 2014-2020 ، وتم أخذ جميع البيانات الخاصة بـ 2952 مريضاً في قاعدة البيانات في هذه الدراسة. أجريت هذه الدراسة على جميع مرضى السرطان المتقدم الذين تلقوا خدمة الرعاية التلطيفية في مدينة الملك فهد الطبية في فترة الدراسة (2014-2020) .تم جمع درجات الأعراض من قبل نظام تقييم أعراض إدمونتون (ESAS) للمرضى الذين تلقوا خدمة الرعاية التلطيفية في مدينة الملك فهد الطبية في فترة الدراسة (2014-2020). الأعراض مثل الغثيان والنعاس والتعب وقلة الشهية وضيق التنفس والقلق والاكتئاب والعافية تم قياسها. تمت ترجمة ESAS إلى العديد من اللغات ، وتم اختبار الصلاحية والموثوقية وإظهار صحتها وموثوقيتها. النقاط الفاصلة للأعراض على النحو التالي: غائب 0 ، خفيف (1-3) ، متوسط (4-6) وشديد (7-10).

النتائج: من إجمالي 2925 مريضاً ، كان 47٪ من الذكور و 53٪ من الإناث. كان متوسط العمر 57 (من 44 إلى 68). أكثر أنواع السرطانات التي تم تشخيصها شيوعًا هي سرطان الجهاز الهضمي (33.0٪) ، يليه سرطان الجهاز البولي التناسلي (15.7٪) ، الثدي (10.8٪) ، الدماغ والجهاز العصبي المركزي (9.2٪) ، سرطان الرأس والعنق (8.7٪) ، الرئة (6.8٪).) وسرطان العظام (4.7٪) وأنواع السرطان الأخرى (4.7٪). بينما كان التشخيص المجهول يمثل (1٪). لم يزد متوسط مقياس الأداء الملطف (PPS) بشكل ملحوظ عند المعالجة اللاحقة من (43.35) إلى (43.93) في المعالجة المسبقة. أظهر انتشار الألم بين مرضى الرعاية التلطيفية في مدينة الملك فهد الطبية وفقًا لمقياس ESAS انخفاضًا ملحوظًا من حيث الألم بنسبة 30٪ ،الاجهاد (25.2٪) ، النعاس (45.4٪) ، الغثيان (57.6٪) ، فقدان الشهية (40٪) وضيق التنفس (46.1٪) والاكتئاب (65٪) والقلق (54.9٪) والعافية (35.1٪) والإمساك (9.9٪) والقيء (81.25٪) والأرق (89.4٪) .كانت الأعراض الخمسة الأولى (انتشار الأعراض أكثر أو تساوي 50٪) هي الغثيان والاكتئاب والقلق والقيء والأرق. كانت هناك ارتباطات ذات دلالة إحصائية بين شدة الألم فيما يتعلق بالعمر والجنس وضيق التنفس وفقدان الشهية عند استخدام قياس PPS وESAS لتقييم فعالية خدمات الرعاية التلطيفية للسيطرة على آلام السرطان.

الخاتمة: كانت التدخلات الملطفة المصممة للأعراض للسيطرة على الألم أكثر بروزًا في الحد من الغثيان والاكتئاب والقلق والقيء والأرق بعد 48 ساعة. يجب أن تحدث التدخلات التعليمية حول الألم والعلاج مباشرة بعد التشخيص ، ويجب التعرف على الألم ومعالجته على الفور ، باستخدام أحد الإرشادات المتاحة.

Chapter – I (Introduction):

Background:

The Palliative care definitionaccording tothe World Health Organization (W.H.O.)is: an approach that improves the quality of life of patients (adults and children) and their families who are facing problems associated with life-threatening illness. It prevents and relieves suffering through the early identification, correct assessment and treatment of pain and other problems, whether physical, psychosocial or spiritual[1].The cancer patients are experience many symptoms and among these symptoms is the pain. The International Association for the Study of Pain (IASP) defines pain as: an unpleasant sensory and emotional experience associated with actual or potential tissue damage[2]. The Pain can be classified into: nociceptive pain (somatic or visceral), neuropathic pain or mixed pain. There are other classifications of pain as acute or chronic[3].To providing healthcare for advance cancer patients, it should deliver by multidisciplinary team. Theteam which usuallyconsistsof: general practitioner, nurses, palliative specialist, oncologist, psychologist spiritual practitioner, social worker, physiotherapist, occupational therapist, pharmacist, dietitian and volunteer[4]. The management of pain can be deliver by no pharmacologic and pharmacological .The no pharmacological management of pain include: heat, ice, occupational therapy, physiotherapy, electrical stimulation, surgical procedure, aromatherapy, biofeedback, meditation, hypnosis, dietary supplement, acupuncture[5]. The pharmacological management is a wide option. According to WHO ladder, there are three steps that can be followed. For mild pain the palliative physician can follow first step which include acetaminophen and

NSAID.For moderate pain the palliative physician can chose drug from second step which include the weak opioids as tramadol, codeine and for the severe pain the palliative physician can prescribe from third step which include morphine, hydromorphone, oxycodone, fentanyl, methadone. Adjuvant therapy can be used in addition to the opioid for pain control[6] and taking in the consideration the impairment of liver and renal function[7].The impact of uncontrolled pain on quality of life are multiple domains, it can affect physical, psychological, level of independence, social relationship, environmental health, spiritual and general wellbeing. If all these occur in uncontrolled pain, so controlling pain it will impact positively on quality of life and improves all these domains[8].

Literature review

In Saudi Arabia, the study conducted by Dr. Omar Al-Zahrani*et al*.,showed the prevalence of pain among advance cancer patients who reviewed in outpatient clinic was 85.5% with median rating 5 and main rating 4.6 according to ESAS score[9] .

Other study conducted by Melissa Mejin*et al*. in Malaysia found the prevalence of pain among advanced cancer patients was61.1 % , and 81.1% had moderate to severe pain according to pain management index[10]. Other study conducted by Scarborough showed prevalence was 64% among those patients with locally advanced cancer or metastasized cancer[11].

The results of this study have showed that although pain treatments are available and provide clear medical evidence of how to use them, some cancer patients still suffer from pain for one reason or another. So, it is important that the doctor and the patient work together to overcome this obstacle. Cancer patients need to

benefit from pain treatments so that their quality of life improves and they can work and rely on themselves to take care of themselves and move. [11].

Across sectional observational study was conducted by Clare Rayment*et al*., in 2012 found that in cancer patients the neuropathic pain in comparing to nociceptive pain had more negative impact on quality of life and need more analgesic doses and had less palliative performance scale [12].

This meta-analysis concluded that it is beneficial and there is need to establish the palliative care services in medical field in Chinese for those patients suffer from advance cancer pain [13].

The early palliative care intervention the highly positively impact on quality life of patients and the decrease demand of aggressive treatment [14] .

In the Emergency Department (E.D.), pain and dyspnea are the most common presenting symptoms in end-of-life elderly with advance cancer, followed by nausea, vomiting and secretion, the palliative care physician is one of important component of emergency staff for treating these types of patients[15].

In this systematic review, Cochrane library, conducted by Philip J Whiffen *et al*., they found 19 from 20 patients treated by opioid they tolerated the opioid side effect, and within 14 days from starting the opioid they must has no pain or mild pain. one or two patients from 10 may not tolerate constipation and nausea, so leading to change opioid to other type [16].

Rationale

Controlling of the cancer pain and other symptoms in advance cancer patients reflect positively on their quality of life. In general, only few

studies available in palliative care field. Further studies in palliative care are required to fill this gap. The researchers have the interest to measure the effectiveness of palliative care serviceson controlling pain among cancer patient in K.F.M.C.

Aim of the study

The aim of this study is to find out the difference between pain intensity in advanced cancer patients before and after receiving palliative in King Fahad Medical City (K.F.M.C) in Riyadh[17].

Specific objectives:

- Measuring the mean of pain scale pre and post palliative treatment.
- Measure Prevalence of the pain among palliative care patients in (K.F.M.C).
- Find out any Association between pain intensityand (age, gender, dyspnea, anorexia and PPS).

Chapter – II (Methodology):

Study setting

This study was tool place in kingdom of Saudi Arabia in King Fahad Medical city in Riyadh region, this medical city is one of health institute that related to Saudi ministry of health (M.O.H) [17].

Study population:

This study was conducteduponallpatients with advance cancer whom received palliative care service at King Fahd Medical City in study period (2014-2020). Estimated number of patients in the study period will be 2500patients.

Selection criteria:

Inclusion Criteria:

All data of cancer patients whom followed by palliative care team in study period (2014 to 2020) and had two completed evaluations by (ESAS scale) pre and post treatment.

Exclusion Criteria:

- Any patient data from data basewhichthe ESAS not complete or has only one ESAS evaluation.
- **Study period:**

Throughout the period of (January 2014 to December 2020)

Study design:

Observational retrospective descriptive study.

Sample size:

This retrospective study was conducted at palliative care Department of King Fahad Medical City, Riyadh from 2014 – 2020.All data of 2952 patients in the data base wastaken in this study.

Ethical considerations:

All data was secured and saved strictly in a secure place with no access except for authorized research team members. All data was used for research purposes only. We were submitting our proposal for IRB approval by 20/11/2021.

Data collection

1- Data collection tool:

Edmonton Symptom Assessment System (E.S.A.S.) is one of the easiest, validated and reliable scale for measure the pain score and even the survival in some type of cancer patients, also can assess other symptoms like nausea, drowsiness, tiredness, lack of appetite, shortness of breath, anxiety, depression and well-being. ESAS translated into many languages, validity and reliability tested and show valid and reliable. The cutoff points of score of the symptoms as following : absent 0 , mild (1-3) , moderate (4-6) and severe (7-10)[18]–[23]

2- Data Collection technique:

Data was collected through the patient's database available at the Department of Palliative Care Unit. There was one third parties (well-trained nurse) who provided ESAS assessment for all patients received palliative care in the palliative care unit (PCU).In thePCU, the nurse provided an ESAS assessment of the patients

at the patient's first interview before receiving any palliative intervention and after 48hours; these data was recorded on data base. All data which contain only one evaluation was not be included in the research samples and should be contain two ESAS evaluations, one before palliative intervention and the other after the palliative intervention. The management of pain in K.F.M.C. depends on W.H.O. protocol. Modified WHO pain ladder used for management of pain in cancer patients, from 1986 up to now the pain ladder underwent modifications. In general, it contains 3 categories of pain degree: for mild pain (1-3/10) start patient on step 1 (salicylate, NSAID and acetaminophen), for moderate pain (4-6/10) or patients consumed maximum doses of step 1 use step 2 (oxycodone or codeine with or without adjutants) and for severe pain (7-10/10) or patient consumed maximum dose of step 2 use (fentanyl, hydromorphone, methadone, morphine with or without adjutants)[24].

3-Data entry and analysis:

- Data entry and analysis was done by using the Statistical Package of the Social sciences (S.P.S.S.) statistical program version 21.
- All data was previously collected in Excel files and preserved in the palliative medicine department database on the King Fahd Medical City intranet.
- Descriptive statistics was applied as mean for continuous variables and frequency and percentage for categorical variables.
- Paired t test was utilized to assess pre- and post-intervention.
- Chi-square test was utilized to test for the association between demographic characteristics of the participants and their pain improvement by palliative care intervention.
- P–value of less than 0.05 was considered significance throughout the study.

Ethical Consideration:

1. Written permission from palliative care fellow program, king Fahad medical city, Riyadh Region to start the study after the proposal approval by the INSTITUTIONAL REVIEW BOARD that was obtained before conducting the study.
2. Permission of palliative care department director was obtained.
3. All information was kept confidential and was not be accessed except for the purpose of the scientific research.
4. Ethical considerations were undertaken through all the research steps.

Chapter – III (Results):

A numberof 2952 patientswere evaluated for the effectiveness of palliative care services to control cancer pain in King Fahad Medical City based in a retrospective data from the year 2014 to the year 2020. The basic demographics are shown in table 1 and figure 1. The average mean total age was found to be (54.62±18.85) years. The high mean (SD) age was reported in the year 2016 (57.0±18.19) years followed by the year 2014 (55.71 ±17.81) years, the year 2019(55.19±19.05) years , 2015 (55.11±17.7) years, 2018 (53.91±19.31) years, 2020 (53.4 ± 19.35) years, and 2017 (52.55 ± 19.71) years. The average total minimum and maximum age was reported to be from 1-103 years. The minimum and maximum age was ranged from 5-93 years in the year 2014, from 3-96 years in 2015, 5-95 years in 2016, 2-101 years in 2017, 2-103 years in 2018, 2-96 years in 2019 and from 1-100 years during the year 2020. The average median age was 57 (44 - 68) years. The high median age was reported during the year 2016 (58 (46 - 70)years, 2019 (58 (45 - 68)) years, 2014 (57 (45 - 70) years, 2015 (57 (43 - 67),2018 (56 (44 – 66)years, and 2020 (55 (41 - 67) years. In terms of gender female was predominance (53% vs.47%) with female to male ratio of (1:1.1). However, the male was predominance during the year 2014 with male to female ratio of (1:1.01). The female to male ratio during the year 2015 was found to be (1.3:1), 2016 (1.3:1), 2017 (1.1:1), 2018 (0.8:1), 2019 (1.2:1) and 2020 (1.2:1). The vast majority of patients were Saudi (96.2%) versus 3.8% non-Saudi patients. All patients' nationality was Saudi during the year 2014, 2015, 2016 , 2017 and 2018, while there were minorities of no-Saudi patients during the year 2019, 2019 and 2020 represents 11.3% and 9.7% respectively.

The most common cancers types diagnosed were gastrointestinal cancer (33.0%), followed by genitourinary cancer (15.7%), breast (10.8%), brain and CNS (9.2%), head and neck cancer (8.7%), lung (6.8%), bone cancer (4.7%) and other cancers (4.7%). While unknown diagnosis was representing (.1%). The diagnosis of bone cancer was increased during the year 2018 (6.2%) and the year 2017 (6%) respectively. Also, high prevalence of brain and CNS cancer were diagnosed during the year 2018 (13.6%) and the year 2017 (11.7%) and the year 2019 (10%). The high prevalence of breast cancer was reported during the year 2017 (13.5%). While the high prevalence of gastrointestinal cancer was reported during the years 2015 (41.7%) and 2019 (36.2%) respectively. The year 2016 witnessed increase the prevalence of genitourinary cancer (20.6%). Hematology cancer prevalence was increased during the year 2014 (8.6%) and the year 2019 (7.1%). In addition, the head and neck cancer were increased in the year 2014 (12.8%) and 2015 (9.2%). The lung cancer prevalence was found high during the year 2016 (8.7%) and the year 2018 (7.7%). In terms of coding status, almost more than half of the patients (50.3%) Do Not Resuscitate (DNR) while 49.7% were provided with full code (all medical procedures to be utilized in attempt to restart a heartbeat and/or breathing).

The most of the years witnessed full code for cancer patients were the years 2020 (52.2%), 2017 (52.1%), and the year 2015 (51.5%). For DNR (Do Not Resuscitate), the high DNR was reported during the years 2019 (56%), 2014 (52.7%) and the year 2016 (49.3%).

The mean, median, and minimum and maximum of pre and post PPS are shown in Table 2.

As displayed in table 3 and figure 3, the overallpre and Post treatment Palliative Performance Scale (PPS) showed no significance differences during the different years (p=.166). However, the mean of Palliative Performance Scale (PPS) not significantly increased at post treatment from (43.35) to (43.93) in pretreatment. With nostatistical significant change of minimum and maximum and median during pre and post treatment. There were significant differences between the mean, minimum and maximum and median of pre and post Palliative Performance Scale during the year 2015 (p=.04) and the year 2016 (p=.013). While no significant differences were found during the year 2014 (p=.122), 2017 (p=.14), 208 (p=.11), 2019 (p=.288) and the year 2020 (p=.269). Table 4 and figure 4 illustrated the Pre and Post treatment ESAS for Pain. There were significance differences between ESAS (Edmonton Symptom Assessment System) for Pain between the years, p<0.001.

The overall ESAS (Edmonton Symptom Assessment System) prevalence for Pain was increased among patients with no pain from pretreatment (13.6%) to post treatment (30%), p<0.001. A patient with mild pain wasincreased significantly from pretreatment 12.8% to 58.1% in post treatment. Concerning the moderate pain, it was significantly increased from 33.5% in pretreatment to 11.1% in post treatment. However, the severe pain was significantly decreased from 40.1% in pretreatment to .8% in post treatment, while the significantly decreased in mean was reported from 4.75 in the pre treatment to 3.33 in post treatment by 29.9%.

In terms of Pre and Post treatment Tiredness, the overall ESAS showed that, the overall prevalence of patients with no tiredness was significantly increased from 14.1% to 19.7% during pre and post treatment and also the overall prevalence of

patients with mild tiredness was significantly cancer increased from 16.6% to 39.5%. The prevalence of moderate tiredness was significantly reduced among cancer patients from 43% to 16.6% during pre and post treatment. In addition, the overall prevalence of severe tiredness was significantly decreased from 26.2% to 8.8% due to intervention.However also the mean and median of ESAS was significantly decreased from 4.45 to 3.33 by 25.2% respectively.

The Pre and Post treatment Drowsiness for cancer patients showed that there were significant differences between drowsiness during the different years, $p<0.001$.The overall prevalence of patients with no drowsiness was significantly increased in pretreatment from 61.1% to 71.9% in the post treatment. Also, the overall prevalence was significantly increased among patients with mild drowsiness from 18.2% in the pretreatment to 19.7% in the post treatment. While dramatic decreased was reported regarding overall prevalence of drowsiness among patients with moderate and severe drowsiness from 13.4% to 6.8% and from 7.3% to 1.5% respectively. The mean drowsiness was significantly changed from 1.74 in pretreatment to 0.95 in post treatment by 45.4%, table 5 and figure 5.Concerning the pre and post treatment nausea, there were significance differences between the overall prevalence of cancers patients and nausea during the different years, $p<0.001$.Increased the prevalence of cancer patients' with no nausea and with mild nausea during pre treatment and post treatment from 59.1% to 74.2% and from 16.9% to 19.8% respectively. However the prevalence of patients with moderate and severe nausea was significantly decreased from 16% to 5.3% and from 8% t 0.7% during pre and post treatment respectively. Also the overall mean nausea of cancer patients was significantly decreased in the pre

treatment from 1.91 to 0.81 in the post treatment by 57.6% as shown in table 6 and figure 6.

Table 7 and figure 7 illustrates that the overall prevalence of loss of appetite was statistically significant different between cancer patients with appetite during the different years, p<0.001. The prevalence of cancer patients were significantly increased among patients with no appetite and patients with mild appetite during the pre treatment and post treatment from 20.8% to 32.8% and from 13.2% to 32.9% respectively. While sharp decreased was reported in the overall prevalence of cancers patients with moderate and severe appetite in pre treatment and post treatment from 34.5% to 26% and from 31.5% to 8.2% respectively. In addition the overall mean (4.68 vs.2.8) and median (5 vs.3) was significantly decreased during pre and post treatment.However, the overall mean and median of loss appetite was reduced by 40%.

Regarding shortness of breath (SOB), the overall prevalence of patients with SOB was significantly different during different years, p<0.001. An increased in the overall prevalence of SOB among cancer patients was significantly reported among patients with no SOB and patients with mild SOB during pre and post treatment from 64.3% to 73.3% and from 15.5% to 19.7% respectively. Good improvement in the prevalence of SOB was reported among cancer patients with moderate and severe SOB from 12.5% to 5.7% and from 7.5% to 1.3% respectively. Likewise, the overall mean of patients' cancer with SOB was significantly decreased during pre and post treatment from 1.65 to 0.89 by 46.1% respectively due to intervention as stated in table 8 and figure 8.

Table 9 and figure 9 indicated the pre and post treatment of depression after intervenes with palliative treatment. There were significant differences regarding overall prevalence of depression among cancer patients during the different years, $p<0.001$. The overall prevalence of depression was significantly increased among patients with no depression and patients with mild depression during pre and post treatment from 61.5% to 74.4% and from 16% to 18.4%. While dramatically reduced was reported among patients with moderate and severe depression during pre and post treatment from 16.6% to 6.3% and from 6% to 0.9% respectively. Hence the overall mean prevalence of cancer patients with depression from 1.73 to 0.84 which reduced by 65%.

As shown in table 10 and figure 10 there were significance differences between pre and post treatment anxiety among cancers patients during the different years, $p<0.001$.

The overall prevalence of anxiety was significantly increased among cancer patients with no anxiety form 56.2% t 71.7% from pre to post treatment. In addition, the overall prevalence of anxiety was significantlyslightly increased from 15.3% to 20.7% during pre and post treatment. Moreover, the overall prevalence of the cancer patients with moderate and severe anxiety was significantly showed sharp decreased from 21.6% to 6.6% and from 6.8% to 1.0% during pre and post treatment. In addition, the overall mean of cancer patients was showed good reduced from 2.04 to 0.92 by 54.9% during pre and post treatment.

Table 11 and figure 11 indicated the pre and post treatment wellbeing after palliative treatment. There were significant differences between cancer patients wellbeing after palliative treatment during different years ($p<0.001$) except for

the year 2015 (p=.787) but the overall prevalence of wellbeing among cancer patients was significantly different (p=.001). The overall prevalence of patients with best feeling wellbeing and patients with mild decline in wellbeing was significantly increased from 42.9% to 56% and from 14.3% to 18.9% respectively.

On the other hand, the cancer patients were moderately decline in wellbeing and severe decline in wellbeing after palliative treatment showed tangible reduced from 29.4% to 19.3% and from 13.5% to 5.8% during pre and post treatment respectively. However, the overall mean of cancer patients with wellbeing was significantly reduced from 2.96 to 1.92 by 35.1%.

In terms of constipation among cancer patients, the overall prevalence of cancer patients with constipation were significantly different during the different years, p=.001. Only the significant increased was shown in cancer patients with no constipation from 79.7% to 94.8% during pre and post treatment. While reduced constipation was reported among cancer patients with mild, moderate and severe constipation during pre and post treatment from 6.6% to 3.6%, from 11.3% to 1.3% and from 2.4% to 0.3% respectively. The overall mean of cancer patients with constipation was significantly reduced from 0.91 to 0.18 by only 9.9%%, table 12 and figure 12.

Concerning pre and post treatment of cancer patients with vomiting, the overall prevalence of cancer patients with vomiting were significantly different during the different years, $p<0.05$. Patients' cancer with no vomiting overall prevalence was significantly increased during pre and post treatment from 93.1% to 97.9%. However dramatically decreased in overall prevalence among cancer patients with mild, moderate and severe vomiting were significantly reduced from 2.5% to

1.6%m from 3.1% to .0 % and from 1.3% to .0 % respectively. In addition, the overall mean of cancer patients with vomiting was significantly reduced from 0.32 to .06 by 81.25% as shown in table 13 and figure 13.

Table 14 and figure 14 shows the pre and post treatment of cancer patients with insomnia using ESAS scale. There were significant differences between cancer patients with insomnia during different years, p<0.001. The overall prevalence of insomnia among cancer patients was significantly increased from 85.9% to 97.3% among patients with no insomnia during pre and post treatment. While remarkable reduced in overall prevalence were reported among patients with mild, moderate and severe insomnia from 3.6% to 2.3%, from 8.7% to 0.5% and from 1.9% to 0.0%. While the overall mean of cancer patients with insomnia was significantly reduced from 0.66 to 0.07 during pre and post treatment by 89.4%.

Table 15 shows the association between pain intensity with regard to age, dyspnea, and anorexia, P<.001. Severe pain was significantly high among age group less or equal 18 years old (52%) followed by the age group 19-44 years (51.8%).

In terms of gender there was significant differences between male and female regard intensity of pain, p<0.001. Severity of pain was significantly high among female (41.3%) compared to male (30.2%).

Shortness of Breath (Dyspnea) was significantly associated with pain intensity, p<0.001. The severity of pain was significantly associated with patients with severe shortness of breath (dyspnea) (44.6%). There was association between intensity of pain and loss of appetite (Anorexia) , p<0.001. However, the loss of

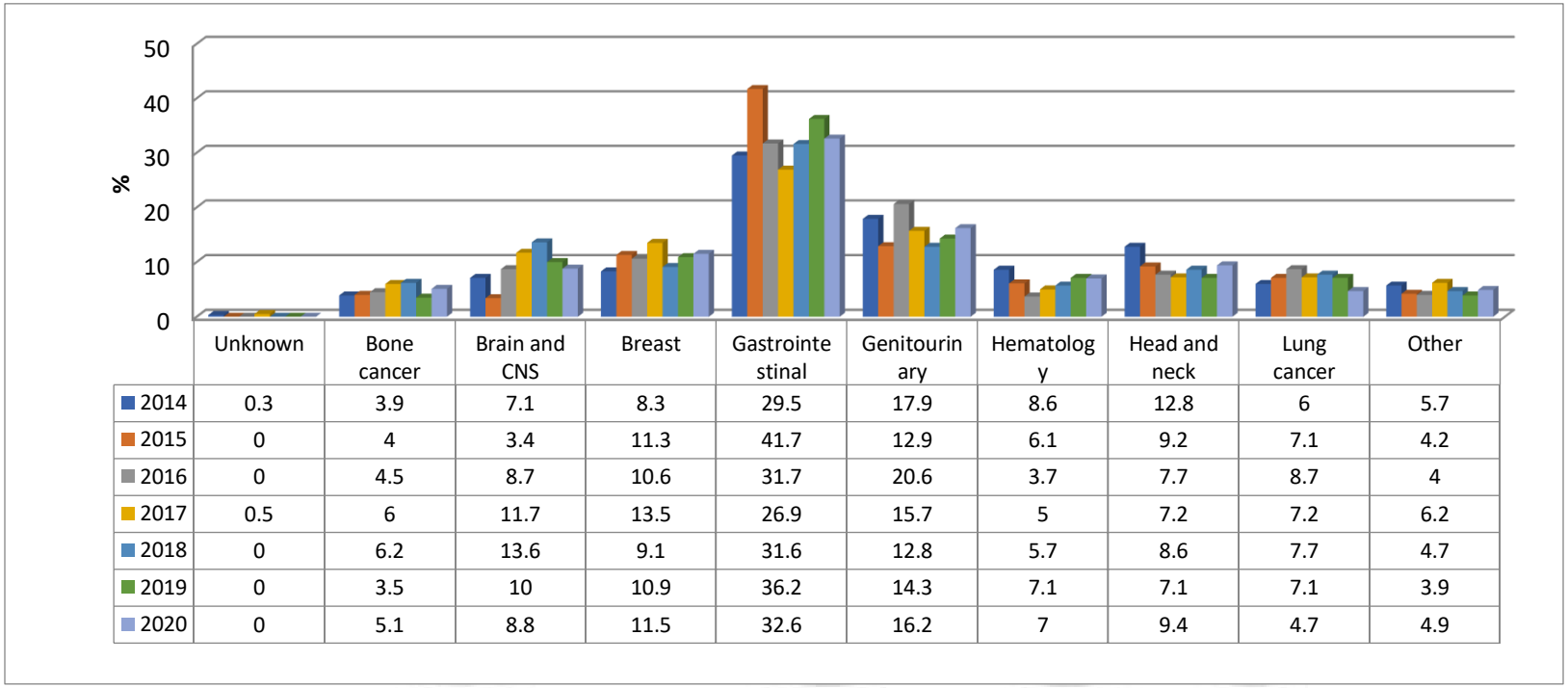
appetite (Anorexia) was significantly found high among patients with mild loss of appetite (45.1%) followed by severe one (42.5%).

Table 15A shows the association between pain intensity with regard to age, dyspnea, and anorexia. There was association between patients age and intensity of pain, $p<0.001$. The severity of pain was significantly greater among patients aged 46-65 years old (44.7%). In terms of gender, the severity of pain was significantly high among female (54.7%) compared to male (45.3%).

There was association between cancer patients with shortness of Breath (Dyspnea) and intensity of pain, $P<0.001$. The severity of pain was significantly reported among cancer patients with no symptoms of SOB (65.6%). While the loss of appetite (Anorexia) was significantly reported among cancer patients with severe loss of appetite (Anorexia) (33.3%).

Table 1: Socio-demographic Characteristics

Characteristic	Description	2014	2015	2016	2017	2018	2019	2020	Total	p value
Age (year)	min ... max	5 ... 93	3 ... 96	5 ... 95	2 ... 101	2 ... 103	2 ... 96	1 ... 100	1 ... 103	0.017
	Mean ± SD	55.71 ± 17.81	55.11 ± 17.7	57 ± 18.19	52.55 ± 19.71	53.91 ± 19.31	55.19 ± 19.05	53.4 ± 19.35	54.62 ± 18.85	
	Median (P25 - P75)	57 (45 - 70)	57 (43 - 67)	58 (46 - 70)	54 (42 - 68)	56 (44 - 66)	58 (45 - 68)	55 (41 - 67)	57 (44 - 68)	
Gender	Female	167 (49.7)	214 (56.5)	213 (56.2)	209 (52.6)	186 (45.9)	291 (54.0)	283 (55.2)	1563 (53.0)	0.028
	Male	169 (50.3)	165 (43.5)	166 (43.8)	188 (47.4)	219 (54.1)	248 (46.0)	230 (44.8)	1385 (47.0)	
Nationality	Non-Saudi	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	61 (11.3)	50 (9.7)	111 (3.8)	<0.001
	Saudi	336 (100.0)	379 (100.0)	379 (100.0)	401 (100.0)	405 (100.0)	478 (88.7)	463 (90.3)	2841 (96.2)	
Diagnosis	Unknown	1 (.3)	0 (0.0)	0 (0.0)	2 (.5)	0 (0.0)	0 (0.0)	0 (0.0)	3 (.1)	<0.001
	bone cancer	13 (3.9)	15 (4.0)	17 (4.5)	24 (6.0)	25 (6.2)	19 (3.5)	26 (5.1)	139 (4.7)	
	brain and CNS	24 (7.1)	13 (3.4)	33 (8.7)	47 (11.7)	55 (13.6)	54 (10.0)	45 (8.8)	271 (9.2)	
	breast	28 (8.3)	43 (11.3)	40 (10.6)	54 (13.5)	37 (9.1)	59 (10.9)	59 (11.5)	320 (10.8)	
	gastrointestinal	99 (29.5)	158 (41.7)	120 (31.7)	108 (26.9)	128 (31.6)	195 (36.2)	167 (32.6)	975 (33.0)	
	genitourinary	60 (17.9)	49 (12.9)	78 (20.6)	63 (15.7)	52 (12.8)	77 (14.3)	83 (16.2)	462 (15.7)	
	hematology	29 (8.6)	23 (6.1)	14 (3.7)	20 (5.0)	23 (5.7)	38 (7.1)	36 (7.0)	183 (6.2)	
	head and neck	43 (12.8)	35 (9.2)	29 (7.7)	29 (7.2)	35 (8.6)	38 (7.1)	48 (9.4)	257 (8.7)	
	lung cancer	20 (6.0)	27 (7.1)	33 (8.7)	29 (7.2)	31 (7.7)	38 (7.1)	24 (4.7)	202 (6.8)	
	Other	19 (5.7)	16 (4.2)	15 (4.0)	25 (6.2)	19 (4.7)	21 (3.9)	25 (4.9)	140 (4.7)	
Code status	DNR	177 (52.7)	184 (48.5)	187 (49.3)	192 (47.9)	199 (49.1)	302 (56.0)	245 (47.8)	1486 (50.3)	0.091
	Full Code	159 (47.3)	195 (51.5)	192 (50.7)	209 (52.1)	206 (50.9)	237 (44.0)	268 (52.2)	1466 (49.7)	



	Unknown	Bone cancer	Brain and CNS	Breast	Gastrointestinal	Genitourinary	Hematology	Head and neck	Lung cancer	Other
2014	0.3	3.9	7.1	8.3	29.5	17.9	8.6	12.8	6	5.7
2015	0	4	3.4	11.3	41.7	12.9	6.1	9.2	7.1	4.2
2016	0	4.5	8.7	10.6	31.7	20.6	3.7	7.7	8.7	4
2017	0.5	6	11.7	13.5	26.9	15.7	5	7.2	7.2	6.2
2018	0	6.2	13.6	9.1	31.6	12.8	5.7	8.6	7.7	4.7
2019	0	3.5	10	10.9	36.2	14.3	7.1	7.1	7.1	3.9
2020	0	5.1	8.8	11.5	32.6	16.2	7	9.4	4.7	4.9

Fig.1. Types of cancer diagnosed during different years

Table 2: Pre and Post treatment Palliative Performance Scale (PPS)

Year	PPS Assessment	min ... max	Mean ± SD	Median (P25 - P75)	p value
2014	Pre treatment	0 ... 90	41.73 ± 13.89	40 (30 - 50)	0.122
	Post treatment	10 ... 90	42.02 ± 13.56	40 (30 - 50)	
2015	Pre treatment	20 ... 90	47.46 ± 12.53	50 (40 - 60)	0.04
	Post treatment	0 ... 90	46.78 ± 14.1	50 (40 - 60)	
2016	Pre treatment	10 ... 80	44.83 ± 13.44	40 (30 - 50)	0.013
	Post treatment	0 ... 80	44.34 ± 14.31	40 (30 - 50)	
2017	Pre treatment	20 ... 80	44.2 ± 10.86	40 (40 - 50)	0.14
	Post treatment	20 ... 80	45.21 ± 11.07	40 (40 - 50)	
2018	Pre treatment	10 ... 90	42.89 ± 14.26	40 (30 - 50)	0.11
	Post treatment	10 ... 90	44.39 ± 13.86	40 (30 - 50)	
2019	Pre treatment	10 ... 90	41.21 ± 14.15	40 (30 - 50)	0.288
	Post treatment	10 ... 90	42.26 ± 13.43	40 (30 - 50)	
2020	Pre treatment	10 ... 80	42.31 ± 13.9	40 (30 - 50)	0.269
	Post treatment	10 ... 80	43.22 ± 13.25	40 (30 - 50)	
	Pre treatment	**0 ... 90**	**43.35 ± 13.56**	**40 (30 - 50)**	**0.166**
Overall	**Post treatment**	**0 ... 90**	**43.93 ± 13.53**	**40 (30 - 50)**	

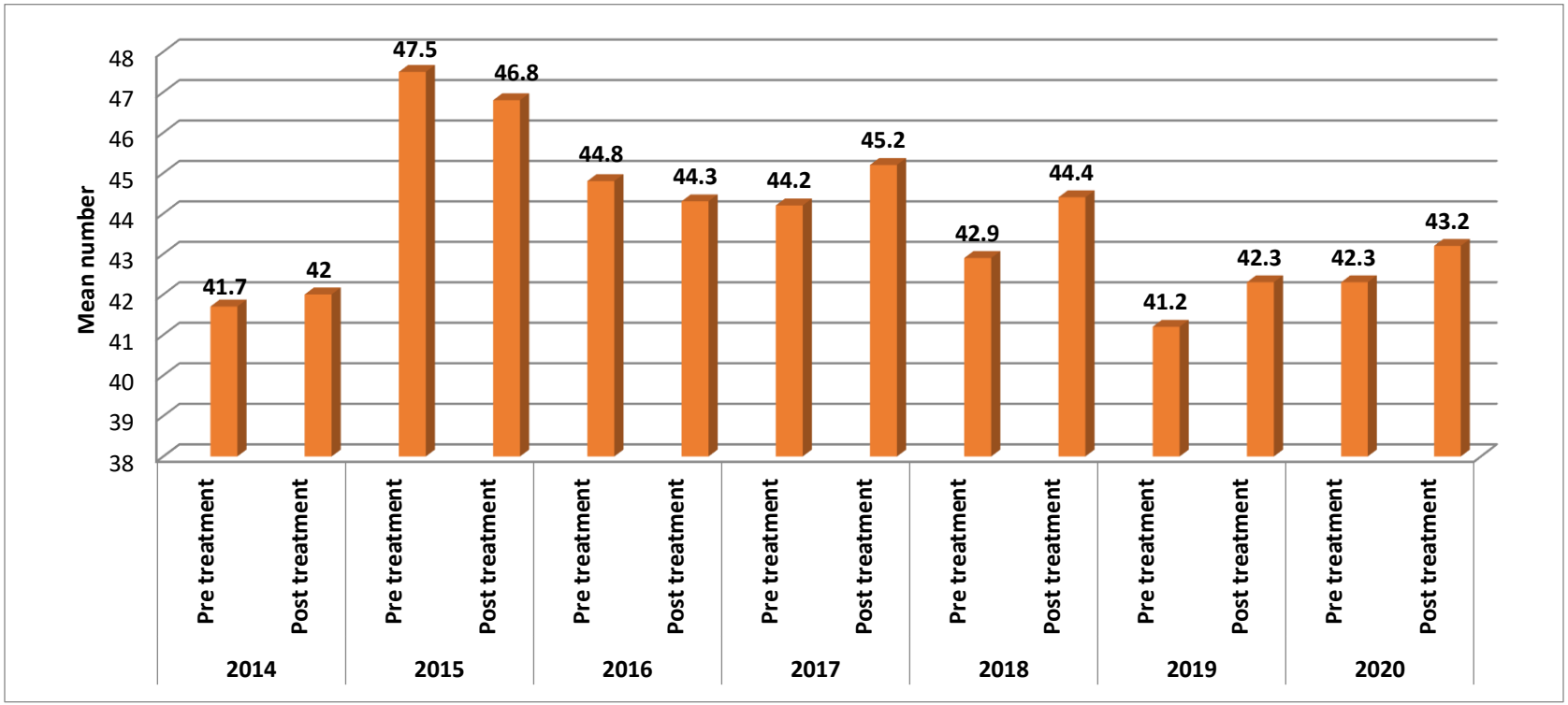
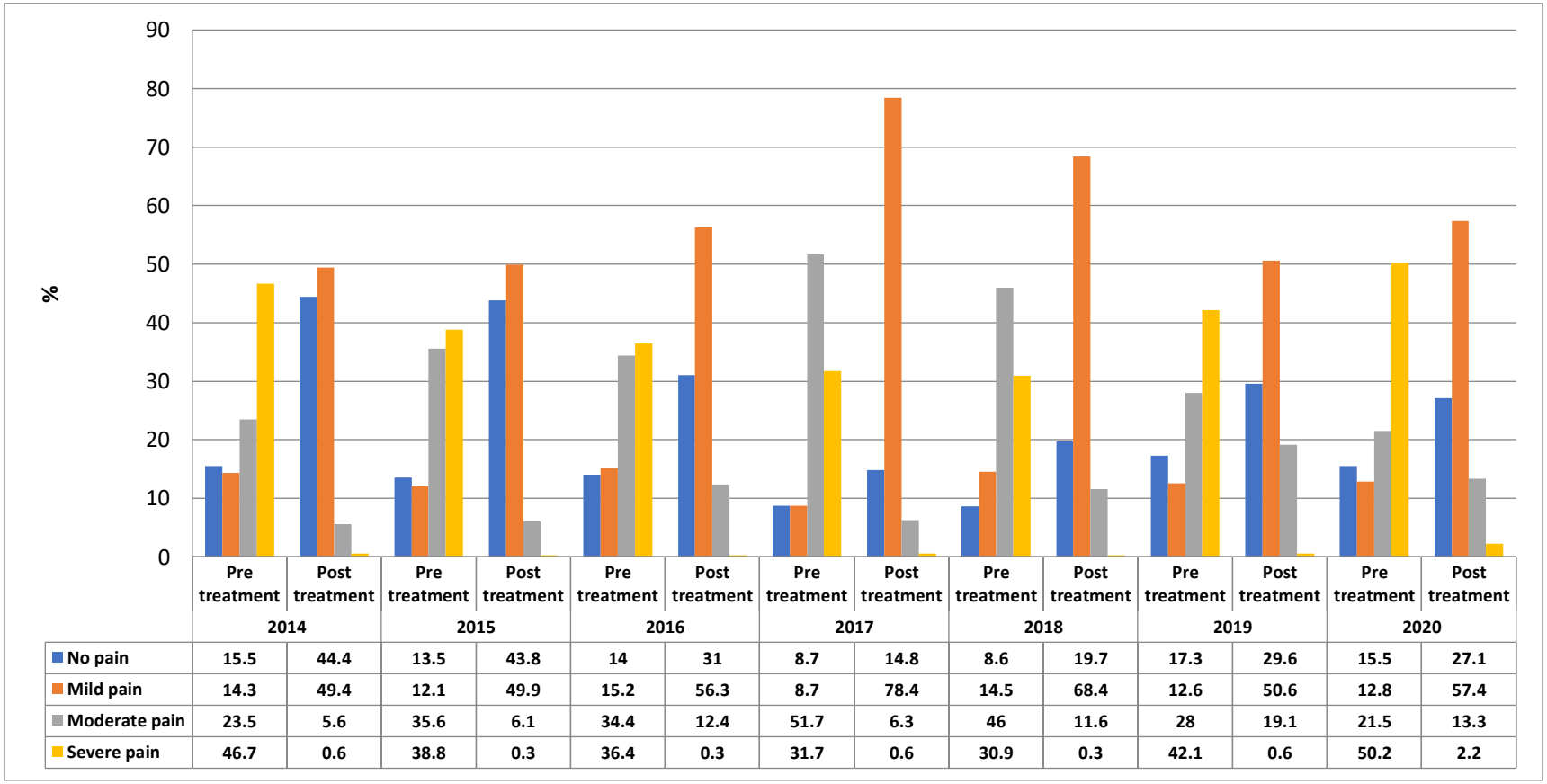


Fig.2. Pre and Post treatment Palliative Performance Scale (PPS)

Table 3: Pre and Post treatment ESAS for Pain

Year	ESAS	No pain	Mild pain	Moderate pain	Severe pain	min ... max	Mean ± SD	Median (P25 - P75)	p value
2014	Pre treatment	52 (15.5)	48 (14.3)	79 (23.5)	157 (46.7)	0 ... 10	5.46 ± 3.23	6 (3 - 8)	<0.001
	Post treatment	143 (44.4)	159 (49.4)	18 (5.6)	2 (.6)	0 ... 8	1.34 ± 1.44	1 (0 - 2)	
2015	Pre treatment	51 (13.5)	46 (12.1)	135 (35.6)	147 (38.8)	0 ... 10	5.28 ± 2.85	6 (3 - 7)	<0.001
	Post treatment	165 (43.8)	188 (49.9)	23 (6.1)	1 (.3)	0 ... 8	1.42 ± 1.47	2 (0 - 2)	
2016	Pre treatment	51 (14.0)	55 (15.2)	125 (34.4)	132 (36.4)	0 ... 10	5.08 ± 2.86	5 (3 - 7)	<0.001
	Post treatment	110 (31.0)	200 (56.3)	44 (12.4)	1 (.3)	0 ... 7	2.13 ± 1.63	3 (0 - 3)	
2017	Pre treatment	31 (8.7)	31 (8.7)	185 (51.7)	111 (31.0)	0 ... 10	5.36 ± 2.32	6 (4 - 7)	<0.001
	Post treatment	52 (14.8)	276 (78.4)	22 (6.3)	2 (.6)	0 ... 9	2.59 ± 1.28	3 (3 - 3)	
2018	Pre treatment	28 (8.6)	47 (14.5)	149 (46.0)	100 (30.9)	0 ... 10	5.23 ± 2.54	5 (4 - 7)	<0.001
	Post treatment	61 (19.7)	212 (68.4)	36 (11.6)	1 (.3)	0 ... 10	2.48 ± 1.48	3 (2 - 3)	
2019	Pre treatment	84 (17.3)	61 (12.6)	136 (28.0)	204 (42.1)	0 ... 10	5.32 ± 3.27	6 (3 - 8)	<0.001
	Post treatment	139 (29.6)	238 (50.6)	90 (19.1)	3 (.6)	0 ... 8	2.44 ± 1.8	3 (0 - 3)	
2020	Pre treatment	74 (15.5)	61 (12.8)	103 (21.5)	240 (50.2)	0 ... 10	5.63 ± 3.25	7 (3 - 8)	<0.001
	Post treatment	122 (27.1)	259 (57.4)	60 (13.3)	10 (2.2)	0 ... 9	2.46 ± 1.75	3 (0 - 3)	
Overall	**Pre treatment**	**371 (13.6)**	**349 (12.8)**	**912 (33.5)**	**1091 (40.1)**	**0 ... 10**	**5.35 ± 2.96**	**6 (3 - 8)**	**<0.001**
	Post treatment	**792 (30.0)**	**1532 (58.1)**	**293 (11.1)**	**20 (.8)**	**0 ... 10**	**2.15 ± 1.65**	**3 (0 - 3)**	

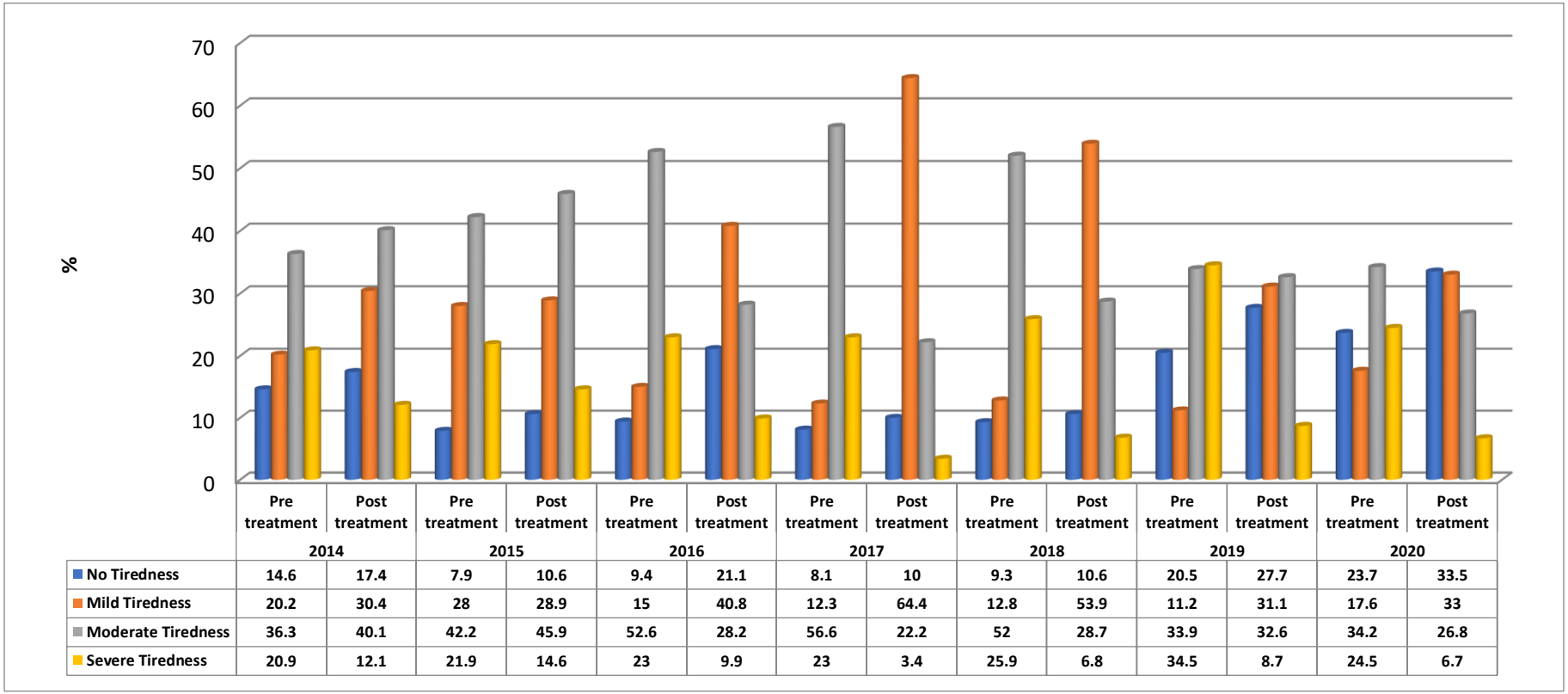


	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment
	2014		2015		2016		2017		2018		2019		2020	
No pain	15.5	44.4	13.5	43.8	14	31	8.7	14.8	8.6	19.7	17.3	29.6	15.5	27.1
Mild pain	14.3	49.4	12.1	49.9	15.2	56.3	8.7	78.4	14.5	68.4	12.6	50.6	12.8	57.4
Moderate pain	23.5	5.6	35.6	6.1	34.4	12.4	51.7	6.3	46	11.6	28	19.1	21.5	13.3
Severe pain	46.7	0.6	38.8	0.3	36.4	0.3	31.7	0.6	30.9	0.3	42.1	0.6	50.2	2.2

Fig. 3: Pre and Post treatment ESAS for Pain

Table 4: Pre and Post treatment Tiredness

Year	ESAS	No **Tiredness**	Mild **Tiredness**	Moderate **Tiredness**	Severe **Tiredness**	min ... max	Mean ± SD	Median (P25 - P75)	p value
2014	Pre treatment	49 (14.6)	68 (20.2)	122 (36.3)	97 (28.9)	0 ... 10	4.64 ± 2.73	5 (3 - 7)	<0.001
	Post treatment	56 (17.4)	98 (30.4)	129 (40.1)	39 (12.1)	0 ... 10	3.7 ± 2.37	4 (2 - 5)	
2015	Pre treatment	30 (7.9)	106 (28.0)	160 (42.2)	83 (21.9)	0 ... 10	4.57 ± 2.3	5 (3 - 6)	<0.001
	Post treatment	40 (10.6)	109 (28.9)	173 (45.9)	55 (14.6)	0 ... 10	4.21 ± 2.24	4 (3 - 6)	
2016	Pre treatment	34 (9.4)	54 (15.0)	190 (52.6)	83 (23.0)	0 ... 10	4.9 ± 2.28	5 (4 - 6)	<0.001
	Post treatment	75 (21.1)	145 (40.8)	100 (28.2)	35 (9.9)	0 ... 10	3.25 ± 2.39	3 (2 - 5)	
2017	Pre treatment	29 (8.1)	44 (12.3)	202 (56.6)	82 (23.0)	0 ... 10	5 ± 2.16	5 (4 - 6)	<0.001
	Post treatment	35 (10.0)	226 (64.4)	78 (22.2)	12 (3.4)	0 ... 8	3.19 ± 1.62	3 (3 - 4)	
2018	Pre treatment	30 (9.3)	41 (12.8)	167 (52.0)	83 (25.9)	0 ... 10	5.1 ± 2.41	5 (4 - 7)	<0.001
	Post treatment	33 (10.6)	167 (53.9)	89 (28.7)	21 (6.8)	0 ... 10	3.4 ± 1.88	3 (3 - 5)	
2019	Pre treatment	99 (20.5)	54 (11.2)	164 (33.9)	167 (34.5)	0 ... 10	4.9 ± 3.17	5 (3 - 8)	<0.001
	Post treatment	130 (27.7)	146 (31.1)	153 (32.6)	41 (8.7)	0 ... 10	3.11 ± 2.37	3 (0 - 5)	
2020	Pre treatment	113 (23.7)	84 (17.6)	163 (34.2)	117 (24.5)	0 ... 10	4.26 ± 3.05	5 (2 - 6)	<0.001
	Post treatment	151 (33.5)	149 (33.0)	121 (26.8)	30 (6.7)	0 ... 10	2.7 ± 2.31	3 (0 - 5)	
Overall	**Pre treatment**	**384 (14.1)**	**451 (16.6)**	**1168 (43.0)**	**712 (26.2)**	**0 ... 10**	**4.75 ± 2.67**	**5 (3 - 7)**	**<0.001**
	Post treatment	**520 (19.7)**	**1040 (39.5)**	**843 (32.0)**	**233 (8.8)**	**0 ... 10**	**3.33 ± 2.25**	**3 (2 - 5)**	

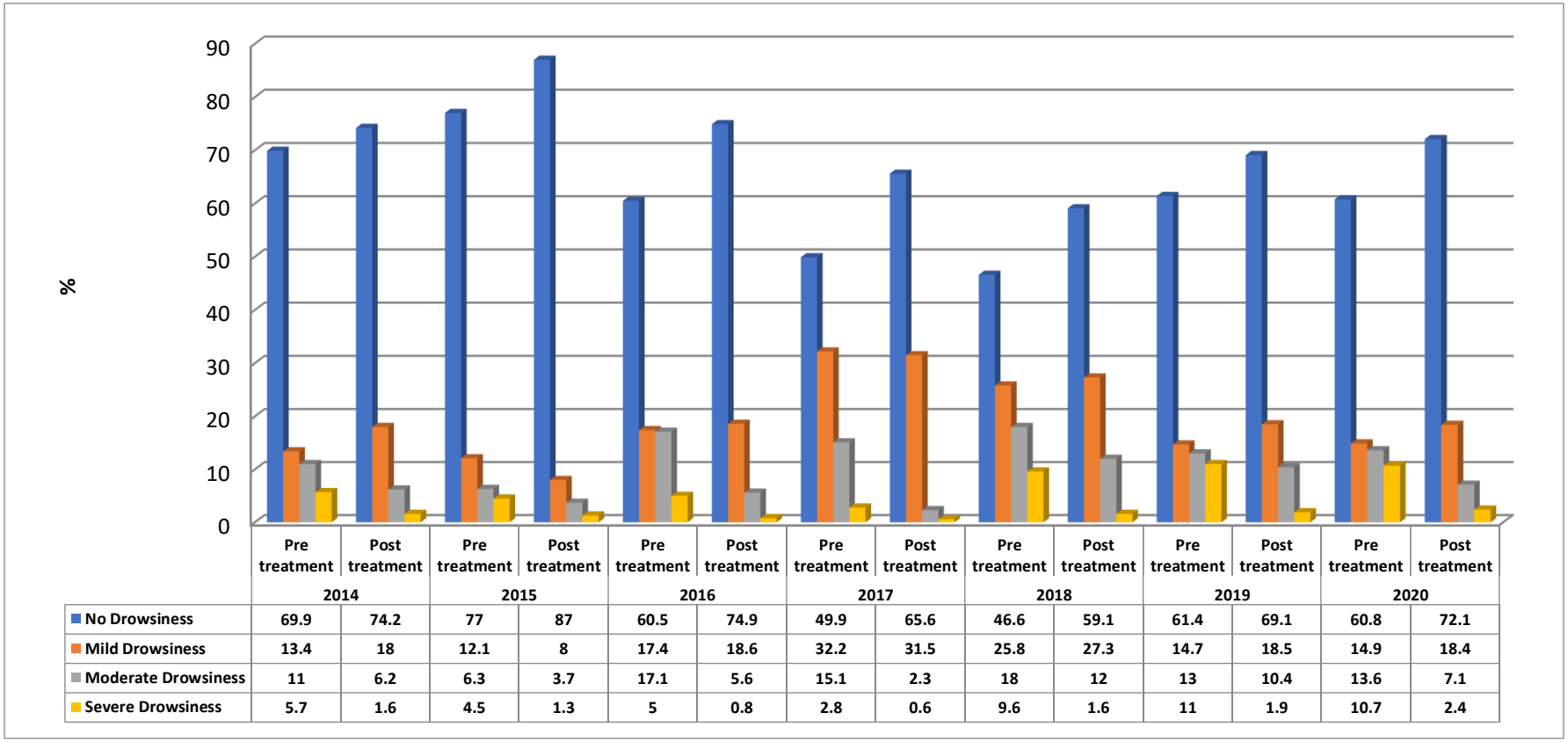


	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment
	2014		2015		2016		2017		2018		2019		2020	
No Tiredness	14.6	17.4	7.9	10.6	9.4	21.1	8.1	10	9.3	10.6	20.5	27.7	23.7	33.5
Mild Tiredness	20.2	30.4	28	28.9	15	40.8	12.3	64.4	12.8	53.9	11.2	31.1	17.6	33
Moderate Tiredness	36.3	40.1	42.2	45.9	52.6	28.2	56.6	22.2	52	28.7	33.9	32.6	34.2	26.8
Severe Tiredness	20.9	12.1	21.9	14.6	23	9.9	23	3.4	25.9	6.8	34.5	8.7	24.5	6.7

Fig. 4: Pre and Post treatment Tiredness

Table 5: Pre and Post treatment Drowsiness

Year	ESAS	No **Drowsiness**	Mild **Drowsiness**	Moderate **Drowsiness**	Severe **Drowsiness**	min ... max	Mean ± SD	Median (P25 - P75)	p value
2014	Pre treatment	235 (69.9)	45 (13.4)	37 (11.0)	19 (5.7)	0 ... 10	1.29 ± 2.33	0 (0 - 2)	<0.001
	Post treatment	239 (74.2)	58 (18.0)	20 (6.2)	5 (1.6)	0 ... 10	0.84 ± 1.72	0 (0 - 1)	
2015	Pre treatment	292 (77.0)	46 (12.1)	24 (6.3)	17 (4.5)	0 ... 9	0.98 ± 2.06	0 (0 - 0)	<0.001
	Post treatment	327 (87.0)	30 (8.0)	14 (3.7)	5 (1.3)	0 ... 8	0.48 ± 1.38	0 (0 - 0)	
2016	Pre treatment	219 (60.5)	63 (17.4)	62 (17.1)	18 (5.0)	0 ... 10	1.66 ± 2.35	0 (0 - 3)	<0.001
	Post treatment	266 (74.9)	66 (18.6)	20 (5.6)	3 (.8)	0 ... 10	0.82 ± 1.59	0 (0 - 1)	
2017	Pre treatment	178 (49.9)	115 (32.2)	54 (15.1)	10 (2.8)	0 ... 8	1.87 ± 2.11	1 (0 - 3)	<0.001
	Post treatment	231 (65.6)	111 (31.5)	8 (2.3)	2 (.6)	0 ... 8	1 ± 1.49	0 (0 - 3)	
2018	Pre treatment	150 (46.6)	83 (25.8)	58 (18.0)	31 (9.6)	0 ... 10	2.39 ± 2.71	2 (0 - 4)	<0.001
	Post treatment	182 (59.1)	84 (27.3)	37 (12.0)	5 (1.6)	0 ... 8	1.37 ± 1.88	0 (0 - 3)	
2019	Pre treatment	297 (61.4)	71 (14.7)	63 (13.0)	53 (11.0)	0 ... 10	1.97 ± 2.89	0 (0 - 3)	<0.001
	Post treatment	325 (69.1)	87 (18.5)	49 (10.4)	9 (1.9)	0 ... 10	1.13 ± 1.88	0 (0 - 3)	
2020	Pre treatment	290 (60.8)	71 (14.9)	65 (13.6)	51 (10.7)	0 ... 10	1.94 ± 2.84	0 (0 - 3)	<0.001
	Post treatment	325 (72.1)	83 (18.4)	32 (7.1)	11 (2.4)	0 ... 10	1.02 ± 1.85	0 (0 - 2)	
Overall	**Pre treatment**	**1661 (61.1)**	**494 (18.2)**	**363 (13.4)**	**199 (7.3)**	**0 ... 10**	**1.74 ± 2.55**	**0 (0 - 3)**	**<0.001**
	Post treatment	**1895 (71.9)**	**519 (19.7)**	**180 (6.8)**	**40 (1.5)**	**0 ... 10**	**0.95 ± 1.72**	**0 (0 - 2)**	

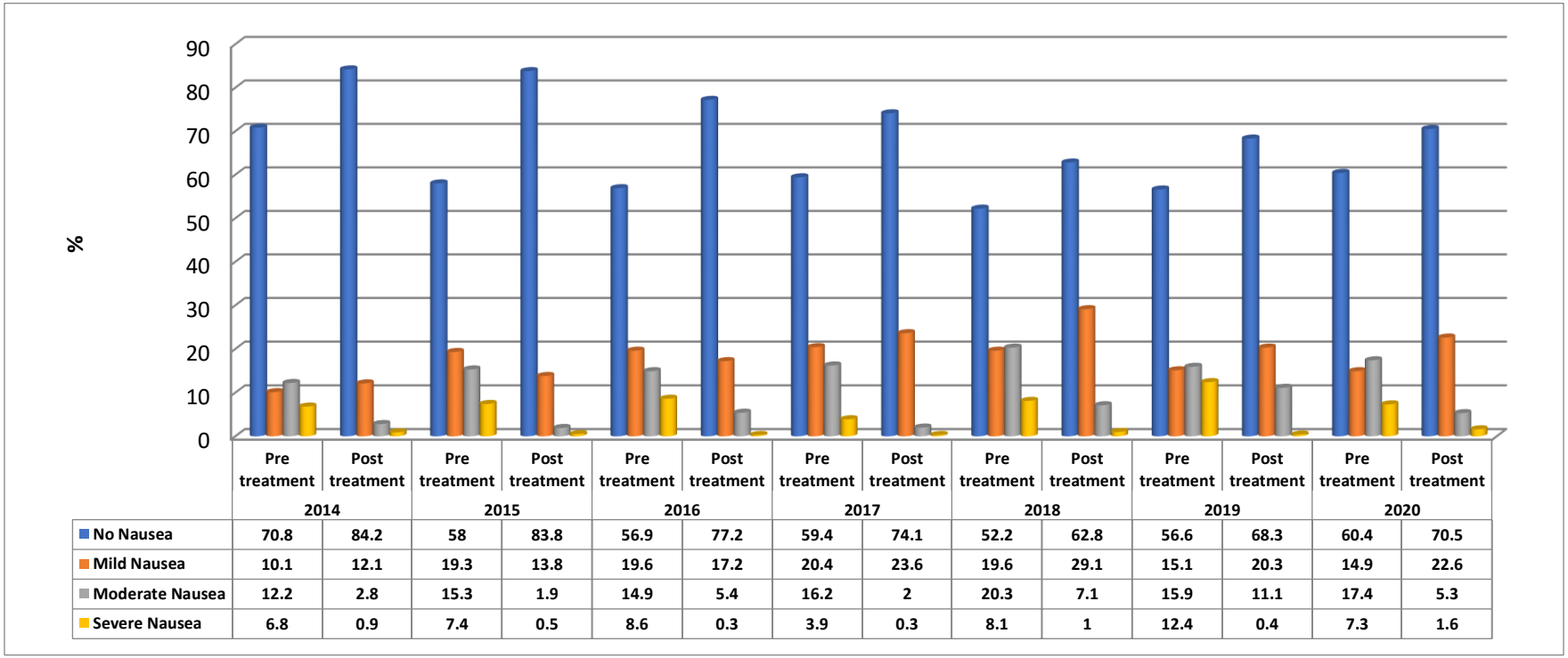


	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment
	2014		2015		2016		2017		2018		2019		2020	
No Drowsiness	69.9	74.2	77	87	60.5	74.9	49.9	65.6	46.6	59.1	61.4	69.1	60.8	72.1
Mild Drowsiness	13.4	18	12.1	8	17.4	18.6	32.2	31.5	25.8	27.3	14.7	18.5	14.9	18.4
Moderate Drowsiness	11	6.2	6.3	3.7	17.1	5.6	15.1	2.3	18	12	13	10.4	13.6	7.1
Severe Drowsiness	5.7	1.6	4.5	1.3	5	0.8	2.8	0.6	9.6	1.6	11	1.9	10.7	2.4

Fig. 5: Pre and Post treatment Drowsiness

Table 6: Pre and Post treatment Nausea

Year	ESAS	No **Nausea**	Mild **Nausea**	Moderate **Nausea**	Severe **Nausea**	min ... max	Mean ± SD	Median (P25 - P75)	p value
2014	Pre treatment	238 (70.8)	34 (10.1)	41 (12.2)	23 (6.8)	0 ... 9	1.39 ± 2.47	0 (0 - 2)	<0.001
	Post treatment	271 (84.2)	39 (12.1)	9 (2.8)	3 (.9)	0 ... 8	0.49 ± 1.3	0 (0 - 0)	
2015	Pre treatment	220 (58.0)	73 (19.3)	58 (15.3)	28 (7.4)	0 ... 10	1.86 ± 2.53	0 (0 - 3)	<0.001
	Post treatment	316 (83.8)	52 (13.8)	7 (1.9)	2 (.5)	0 ... 8	0.45 ± 1.17	0 (0 - 0)	
2016	Pre treatment	206 (56.9)	71 (19.6)	54 (14.9)	31 (8.6)	0 ... 10	1.96 ± 2.67	0 (0 - 3)	<0.001
	Post treatment	274 (77.2)	61 (17.2)	19 (5.4)	1 (.3)	0 ... 7	0.74 ± 1.46	0 (0 - 0)	
2017	Pre treatment	212 (59.4)	73 (20.4)	58 (16.2)	14 (3.9)	0 ... 10	1.67 ± 2.28	0 (0 - 3)	<0.001
	Post treatment	260 (74.1)	83 (23.6)	7 (2.0)	1 (.3)	0 ... 7	0.73 ± 1.32	0 (0 - 2)	
2018	Pre treatment	168 (52.2)	63 (19.6)	65 (20.2)	26 (8.1)	0 ... 10	2.21 ± 2.69	0 (0 - 4)	<0.001
	Post treatment	194 (62.8)	90 (29.1)	22 (7.1)	3 (1.0)	0 ... 10	1.14 ± 1.68	0 (0 - 2)	
2019	Pre treatment	274 (56.6)	73 (15.1)	77 (15.9)	60 (12.4)	0 ... 10	2.25 ± 3.04	0 (0 - 5)	<0.001
	Post treatment	321 (68.3)	95 (20.2)	52 (11.1)	2 (.4)	0 ... 8	1.08 ± 1.73	0 (0 - 2)	
2020	Pre treatment	288 (60.4)	71 (14.9)	83 (17.4)	35 (7.3)	0 ... 10	1.91 ± 2.75	0 (0 - 3)	<0.001
	Post treatment	318 (70.5)	102 (22.6)	24 (5.3)	7 (1.6)	0 ... 8	0.97 ± 1.68	0 (0 - 2)	
Overall	**Pre treatment**	**1606 (59.1)**	**458 (16.9)**	**436 (16.0)**	**217 (8.0)**	**0 ... 10**	**1.91 ± 2.68**	**0 (0 - 3)**	**<0.001**
	Post treatment	**1954 (74.2)**	**522 (19.8)**	**140 (5.3)**	**19 (.7)**	**0 ... 10**	**0.81 ± 1.53**	**0 (0 - 2)**	

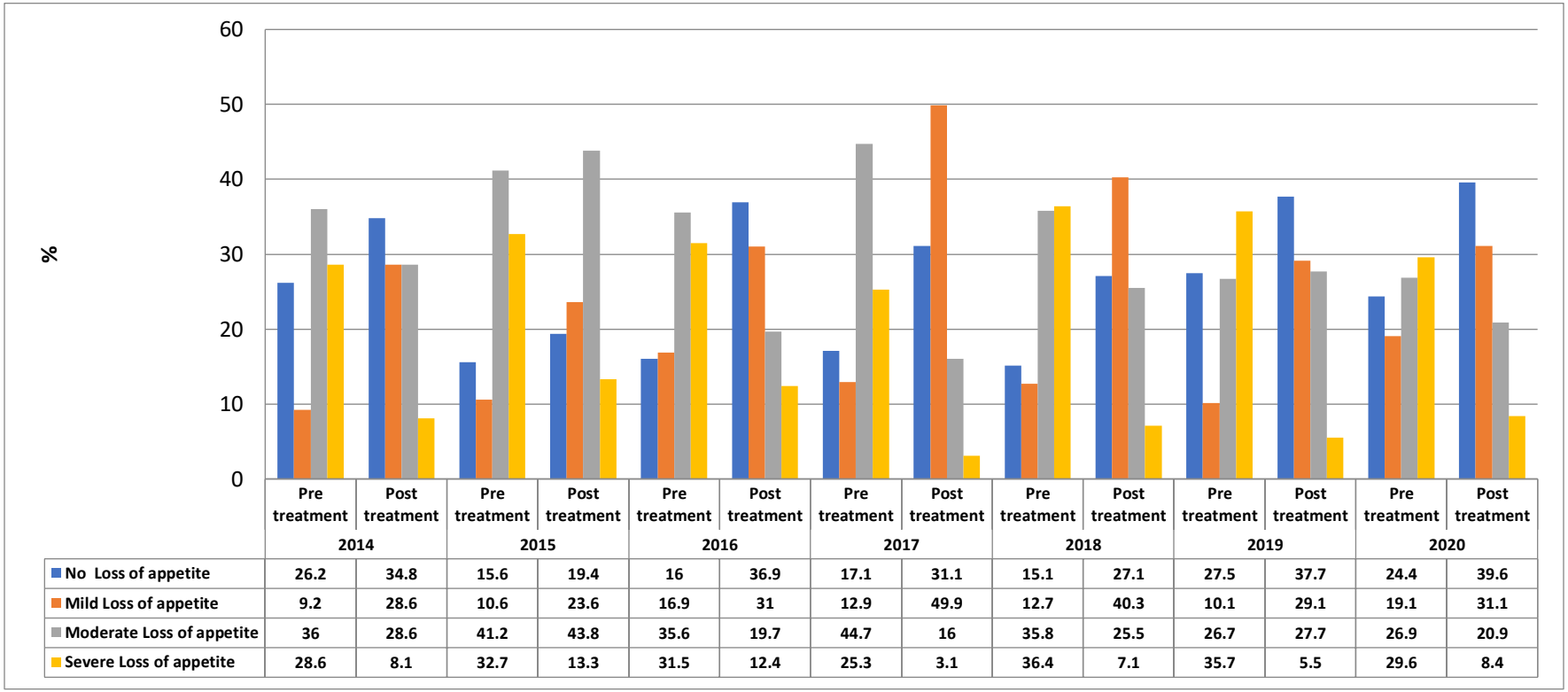


	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment
	2014		2015		2016		2017		2018		2019		2020	
No Nausea	70.8	84.2	58	83.8	56.9	77.2	59.4	74.1	52.2	62.8	56.6	68.3	60.4	70.5
Mild Nausea	10.1	12.1	19.3	13.8	19.6	17.2	20.4	23.6	19.6	29.1	15.1	20.3	14.9	22.6
Moderate Nausea	12.2	2.8	15.3	1.9	14.9	5.4	16.2	2	20.3	7.1	15.9	11.1	17.4	5.3
Severe Nausea	6.8	0.9	7.4	0.5	8.6	0.3	3.9	0.3	8.1	1	12.4	0.4	7.3	1.6

Fig. 6: Pre and Post treatment Nausea

Table 7: Pre and Post treatment Loss of appetite

Year	ESAS	No**Loss of appetite**	Mild **Loss of appetite**	Moderate **Loss of appetite**	Severe **Loss of appetite**	min ... max	Mean ± SD	Median (P25 - P75)	p value
2014	Pre treatment	88 (26.2)	31 (9.2)	121 (36.0)	96 (28.6)	0 ... 10	4.32 ± 3.08	5 (0 - 7)	<0.001
	Post treatment	112 (34.8)	92 (28.6)	92 (28.6)	26 (8.1)	0 ... 10	2.69 ± 2.49	3 (0 - 4)	
2015	Pre treatment	59 (15.6)	40 (10.6)	156 (41.2)	124 (32.7)	0 ... 10	4.89 ± 2.66	5 (3 - 7)	<0.001
	Post treatment	73 (19.4)	89 (23.6)	165 (43.8)	50 (13.3)	0 ... 10	3.78 ± 2.43	4 (2 - 5)	
2016	Pre treatment	58 (16.0)	61 (16.9)	129 (35.6)	114 (31.5)	0 ... 10	4.81 ± 2.85	5 (3 - 7)	<0.001
	Post treatment	131 (36.9)	110 (31.0)	70 (19.7)	44 (12.4)	0 ... 10	2.81 ± 2.73	3 (0 - 5)	
2017	Pre treatment	61 (17.1)	46 (12.9)	159 (44.7)	90 (25.3)	0 ... 10	4.63 ± 2.67	5 (3 - 7)	<0.001
	Post treatment	109 (31.1)	175 (49.9)	56 (16.0)	11 (3.1)	0 ... 10	2.41 ± 1.98	3 (0 - 3)	
2018	Pre treatment	49 (15.1)	41 (12.7)	116 (35.8)	118 (36.4)	0 ... 10	5.09 ± 2.88	5 (3 - 8)	<0.001
	Post treatment	84 (27.1)	125 (40.3)	79 (25.5)	22 (7.1)	0 ... 10	2.89 ± 2.32	3 (0 - 5)	
2019	Pre treatment	133 (27.5)	49 (10.1)	129 (26.7)	173 (35.7)	0 ... 10	4.62 ± 3.42	5 (0 - 8)	<0.001
	Post treatment	177 (37.7)	137 (29.1)	130 (27.7)	26 (5.5)	0 ... 10	2.57 ± 2.36	3 (0 - 4)	
2020	Pre treatment	116 (24.4)	91 (19.1)	128 (26.9)	141 (29.6)	0 ... 10	4.46 ± 3.33	5 (1 - 7)	<0.001
	Post treatment	178 (39.6)	140 (31.1)	94 (20.9)	38 (8.4)	0 ... 10	2.52 ± 2.5	3 (0 - 5)	
Overall	**Pre treatment**	**564 (20.8)**	**359 (13.2)**	**938 (34.5)**	**856 (31.5)**	**0 ... 10**	**4.68 ± 3.04**	**5 (3 - 7)**	**<0.001**
	Post treatment	**864 (32.8)**	**868 (32.9)**	**686 (26.0)**	**217 (8.2)**	**0 ... 10**	**2.8 ± 2.45**	**3 (0 - 5)**	

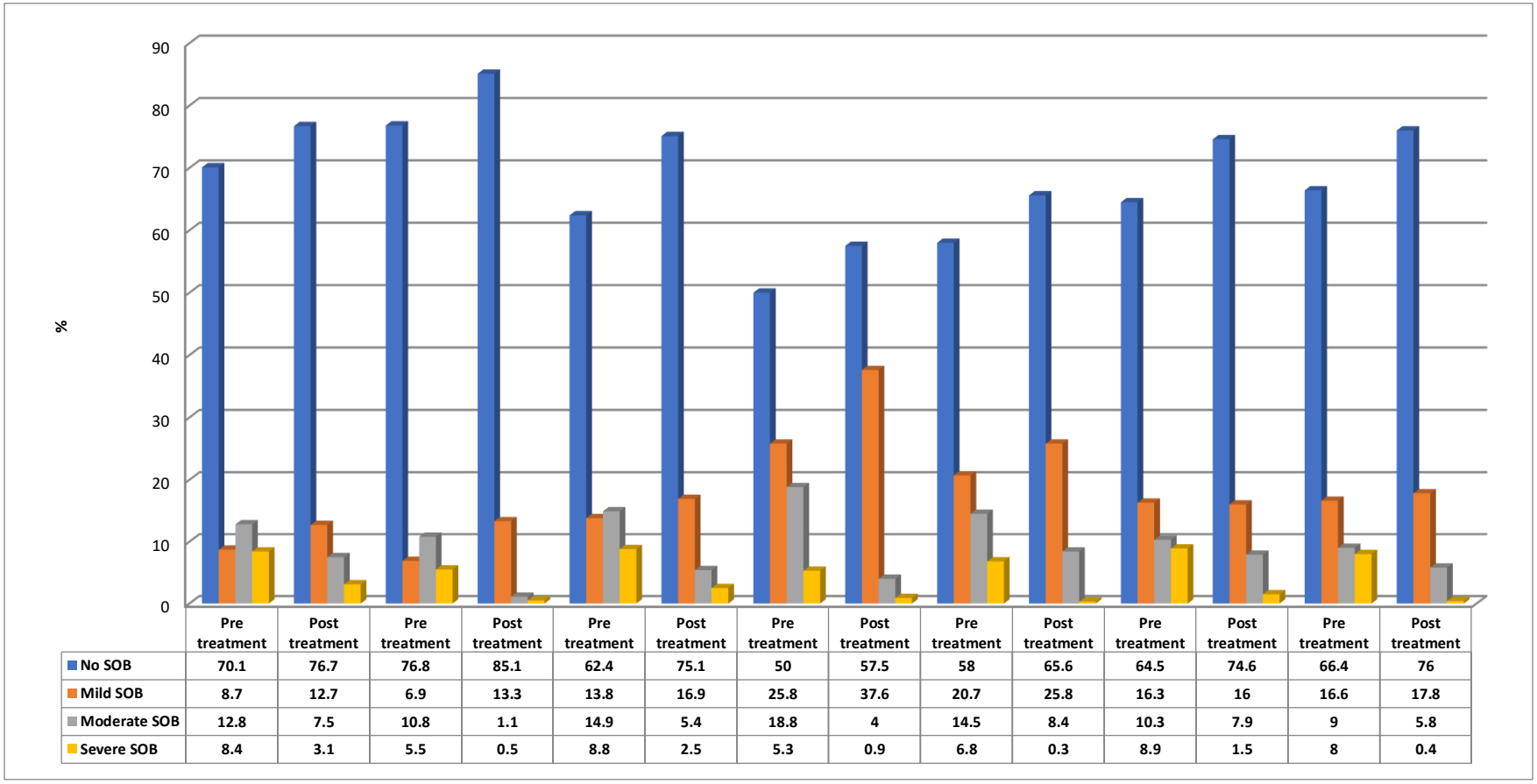


	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment
	2014		2015		2016		2017		2018		2019		2020	
No Loss of appetite	26.2	34.8	15.6	19.4	16	36.9	17.1	31.1	15.1	27.1	27.5	37.7	24.4	39.6
Mild Loss of appetite	9.2	28.6	10.6	23.6	16.9	31	12.9	49.9	12.7	40.3	10.1	29.1	19.1	31.1
Moderate Loss of appetite	36	28.6	41.2	43.8	35.6	19.7	44.7	16	35.8	25.5	26.7	27.7	26.9	20.9
Severe Loss of appetite	28.6	8.1	32.7	13.3	31.5	12.4	25.3	3.1	36.4	7.1	35.7	5.5	29.6	8.4

Fig. 7: Pre and Post treatment Loss of appetite

Table 8: Pre and Post treatment SOB (shortness of breath)

Year	ESAS	No **SOB**	Mild **SOB**	Moderate **SOB**	Severe **SOB**	min ... max	Mean ± SD	Median (P25 - P75)	p value
2014	Pre treatment	235 (70.1)	29 (8.7)	43 (12.8)	28 (8.4)	0 ... 10	1.52 ± 2.65	0 (0 - 3)	<0.001
	Post treatment	247 (76.7)	41 (12.7)	24 (7.5)	10 (3.1)	0 ... 9	0.91 ± 1.91	0 (0 - 0)	
2015	Pre treatment	291 (76.8)	26 (6.9)	41 (10.8)	21 (5.5)	0 ... 10	1.16 ± 2.32	0 (0 - 0)	<0.001
	Post treatment	321 (85.1)	50 (13.3)	4 (1.1)	2 (.5)	0 ... 8	0.39 ± 1.07	0 (0 - 0)	
2016	Pre treatment	226 (62.4)	50 (13.8)	54 (14.9)	32 (8.8)	0 ... 10	1.81 ± 2.68	0 (0 - 3)	<0.001
	Post treatment	266 (75.1)	60 (16.9)	19 (5.4)	9 (2.5)	0 ... 8	0.91 ± 1.8	0 (0 - 0)	
2017	Pre treatment	178 (50.0)	92 (25.8)	67 (18.8)	19 (5.3)	0 ... 10	2.1 ± 2.41	1 (0 - 3)	<0.001
	Post treatment	202 (57.5)	132 (37.6)	14 (4.0)	3 (.9)	0 ... 9	1.31 ± 1.66	0 (0 - 3)	
2018	Pre treatment	188 (58.0)	67 (20.7)	47 (14.5)	22 (6.8)	0 ... 10	1.83 ± 2.5	0 (0 - 3)	<0.001
	Post treatment	203 (65.5)	80 (25.8)	26 (8.4)	1 (.3)	0 ... 7	1.09 ± 1.66	0 (0 - 2)	
2019	Pre treatment	312 (64.5)	79 (16.3)	50 (10.3)	43 (8.9)	0 ... 10	1.68 ± 2.68	0 (0 - 3)	<0.001
	Post treatment	350 (74.6)	75 (16.0)	37 (7.9)	7 (1.5)	0 ... 8	0.93 ± 1.73	0 (0 - 2)	
2020	Pre treatment	316 (66.4)	79 (16.6)	43 (9.0)	38 (8.0)	0 ... 10	1.51 ± 2.6	0 (0 - 3)	<0.001
	Post treatment	342 (76.0)	80 (17.8)	26 (5.8)	2 (.4)	0 ... 10	0.79 ± 1.55	0 (0 - 0)	
Overall	**Pre treatment**	**1746 (64.3)**	**422 (15.5)**	**345 (12.7)**	**203 (7.5)**	**0 ... 10**	**1.65 ± 2.57**	**0 (0 - 3)**	**<0.001**
	Post treatment	**1931 (73.3)**	**518 (19.7)**	**150 (5.7)**	**34 (1.3)**	**0 ... 10**	**0.89 ± 1.65**	**0 (0 - 2)**	

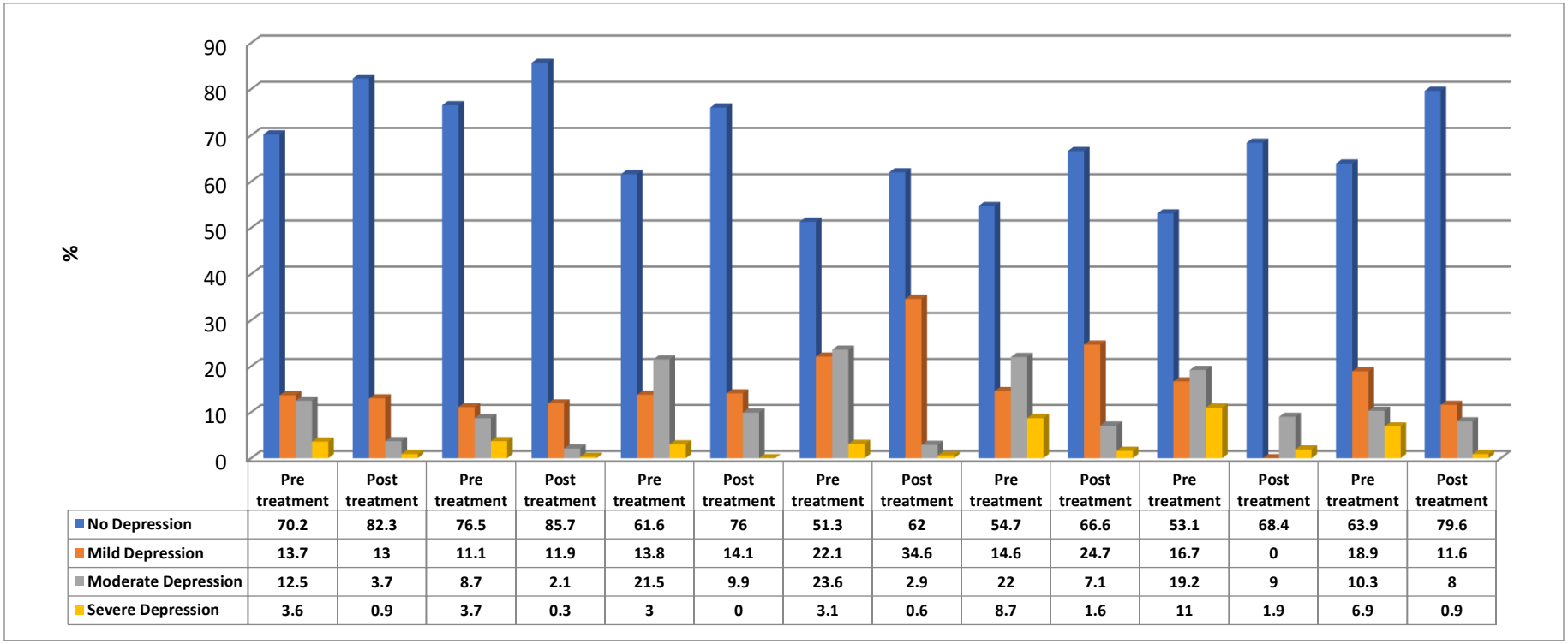


	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment
No SOB	70.1	76.7	76.8	85.1	62.4	75.1	50	57.5	58	65.6	64.5	74.6	66.4	76
Mild SOB	8.7	12.7	6.9	13.3	13.8	16.9	25.8	37.6	20.7	25.8	16.3	16	16.6	17.8
Moderate SOB	12.8	7.5	10.8	1.1	14.9	5.4	18.8	4	14.5	8.4	10.3	7.9	9	5.8
Severe SOB	8.4	3.1	5.5	0.5	8.8	2.5	5.3	0.9	6.8	0.3	8.9	1.5	8	0.4

Fig. 8: Pre and Post treatment SOB

Table 9: Pre and Post treatment Depression

Year	**ESAS**	No **Depression**	Mild **Depression**	Moderate **Depression**	Severe **Depression**	min ... max	Mean ± SD	Median (P25 - P75)	p value
2014	Pre treatment	236 (70.2)	46 (13.7)	42 (12.5)	12 (3.6)	0 ... 10	1.25 ± 2.19	0 (0 - 3)	<0.001
	Post treatment	265 (82.3)	42 (13.0)	12 (3.7)	3 (.9)	0 ... 8	0.5 ± 1.27	0 (0 - 0)	
2015	Pre treatment	290 (76.5)	42 (11.1)	33 (8.7)	14 (3.7)	0 ... 8	1.01 ± 2.02	0 (0 - 0)	<0.001
	Post treatment	323 (85.7)	45 (11.9)	8 (2.1)	1 (.3)	0 ... 7	0.44 ± 1.13	0 (0 - 0)	
2016	Pre treatment	223 (61.6)	50 (13.8)	78 (21.5)	11 (3.0)	0 ... 8	1.65 ± 2.3	0 (0 - 3)	<0.001
	Post treatment	269 (76.0)	50 (14.1)	35 (9.9)	0 (0.0)	0 ... 6	0.84 ± 1.58	0 (0 - 0)	
2017	Pre treatment	183 (51.3)	79 (22.1)	84 (23.5)	11 (3.1)	0 ... 10	2 ± 2.28	0 (0 - 4)	<0.001
	Post treatment	217 (62.0)	121 (34.6)	10 (2.9)	2 (.6)	0 ... 8	1.11 ± 1.52	0 (0 - 3)	
2018	Pre treatment	176 (54.7)	47 (14.6)	71 (22.0)	28 (8.7)	0 ... 10	2.17 ± 2.74	0 (0 - 4)	<0.001
	Post treatment	205 (66.6)	76 (24.7)	22 (7.1)	5 (1.6)	0 ... 8	1.12 ± 1.78	0 (0 - 2)	
2019	Pre treatment	257 (53.1)	81 (16.7)	93 (19.2)	53 (11.0)	0 ... 10	2.33 ± 2.92	0 (0 - 5)	<0.001
	Post treatment	321 (68.4)	97 (20.7)	42 (9.0)	9 (1.9)	0 ... 8	1.12 ± 1.86	0 (0 - 2)	
2020	Pre treatment	304 (63.9)	90 (18.9)	49 (10.3)	33 (6.9)	0 ... 10	1.57 ± 2.52	0 (0 - 3)	<0.001
	Post treatment	358 (79.6)	52 (11.6)	36 (8.0)	4 (.9)	0 ... 10	0.74 ± 1.62	0 (0 - 0)	
Overall	**Pre treatment**	**1669 (61.5)**	**435 (16.0)**	**450 (16.6)**	**162 (6.0)**	**0 ... 10**	**1.73 ± 2.5**	**0 (0 - 3)**	**<0.001**
	Post treatment	**1958 (74.4)**	**483 (18.4)**	**165 (6.3)**	**24 (.9)**	**0 ... 10**	**0.84 ± 1.59**	**0 (0 - 2)**	

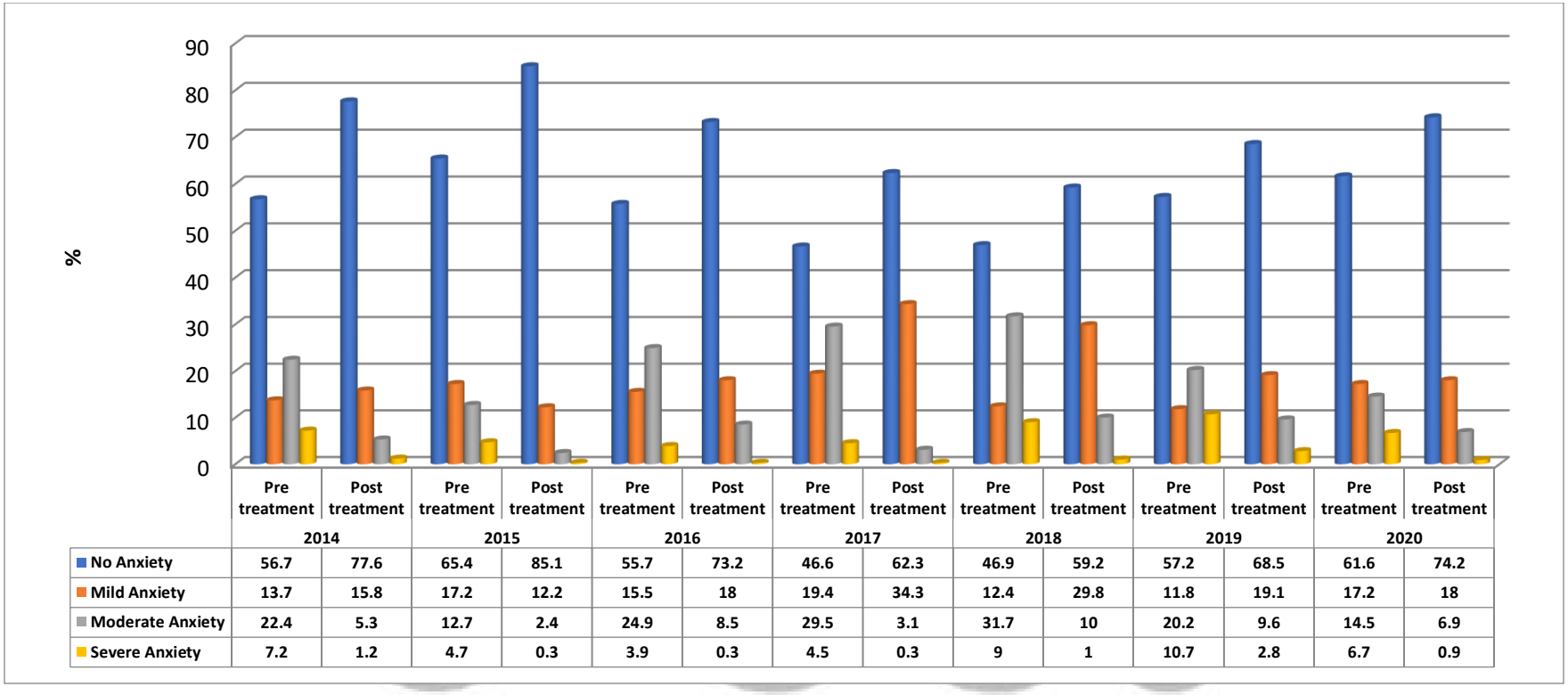


	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment
No Depression	70.2	82.3	76.5	85.7	61.6	76	51.3	62	54.7	66.6	53.1	68.4	63.9	79.6
Mild Depression	13.7	13	11.1	11.9	13.8	14.1	22.1	34.6	14.6	24.7	16.7	0	18.9	11.6
Moderate Depression	12.5	3.7	8.7	2.1	21.5	9.9	23.6	2.9	22	7.1	19.2	9	10.3	8
Severe Depression	3.6	0.9	3.7	0.3	3	0	3.1	0.6	8.7	1.6	11	1.9	6.9	0.9

Fig. 9: Pre and Post treatment Depression

Table 10: Pre and Post treatment Anxiety

Year	ESAS	No **Anxiety**	Mild **Anxiety**	Moderate **Anxiety**	Severe **Anxiety**	min ... max	Mean ± SD	Median (P25 - P75)	p value
2014	Pre treatment	190 (56.7)	46 (13.7)	75 (22.4)	24 (7.2)	0 ... 10	2.03 ± 2.67	0 (0 - 4)	<0.001
	Post treatment	250 (77.6)	51 (15.8)	17 (5.3)	4 (1.2)	0 ... 10	0.66 ± 1.46	0 (0 - 0)	
2015	Pre treatment	248 (65.4)	65 (17.2)	48 (12.7)	18 (4.7)	0 ... 9	1.46 ± 2.26	0 (0 - 3)	<0.001
	Post treatment	321 (85.1)	46 (12.2)	9 (2.4)	1 (.3)	0 ... 9	0.44 ± 1.17	0 (0 - 0)	
2016	Pre treatment	201 (55.7)	56 (15.5)	90 (24.9)	14 (3.9)	0 ... 9	1.99 ± 2.45	0 (0 - 4)	<0.001
	Post treatment	260 (73.2)	64 (18.0)	30 (8.5)	1 (.3)	0 ... 8	0.9 ± 1.62	0 (0 - 2)	
2017	Pre treatment	166 (46.6)	69 (19.4)	105 (29.5)	16 (4.5)	0 ... 10	2.35 ± 2.45	3 (0 - 5)	<0.001
	Post treatment	218 (62.3)	120 (34.3)	11 (3.1)	1 (.3)	0 ... 10	1.08 ± 1.5	0 (0 - 3)	
2018	Pre treatment	151 (46.9)	40 (12.4)	102 (31.7)	29 (9.0)	0 ... 10	2.62 ± 2.78	3 (0 - 5)	<0.001
	Post treatment	183 (59.2)	92 (29.8)	31 (10.0)	3 (1.0)	0 ... 8	1.33 ± 1.79	0 (0 - 3)	
2019	Pre treatment	277 (57.2)	57 (11.8)	98 (20.2)	52 (10.7)	0 ... 10	2.25 ± 2.97	0 (0 - 5)	<0.001
	Post treatment	322 (68.5)	90 (19.1)	45 (9.6)	13 (2.8)	0 ... 9	1.17 ± 1.94	0 (0 - 3)	
2020	Pre treatment	293 (61.6)	82 (17.2)	69 (14.5)	32 (6.7)	0 ... 10	1.73 ± 2.58	0 (0 - 3)	<0.001
	Post treatment	334 (74.2)	81 (18.0)	31 (6.9)	4 (.9)	0 ... 8	0.84 ± 1.57	0 (0 - 2)	
Overall	**Pre treatment**	**1526 (56.2)**	**415 (15.3)**	**587 (21.6)**	**185 (6.8)**	**0 ... 10**	**2.04 ± 2.64**	**0 (0 - 4)**	**<0.001**
	Post treatment	**1888 (71.7)**	**544 (20.7)**	**174 (6.6)**	**27 (1.0)**	**0 ... 10**	**0.92 ± 1.63**	**0 (0 - 2)**	

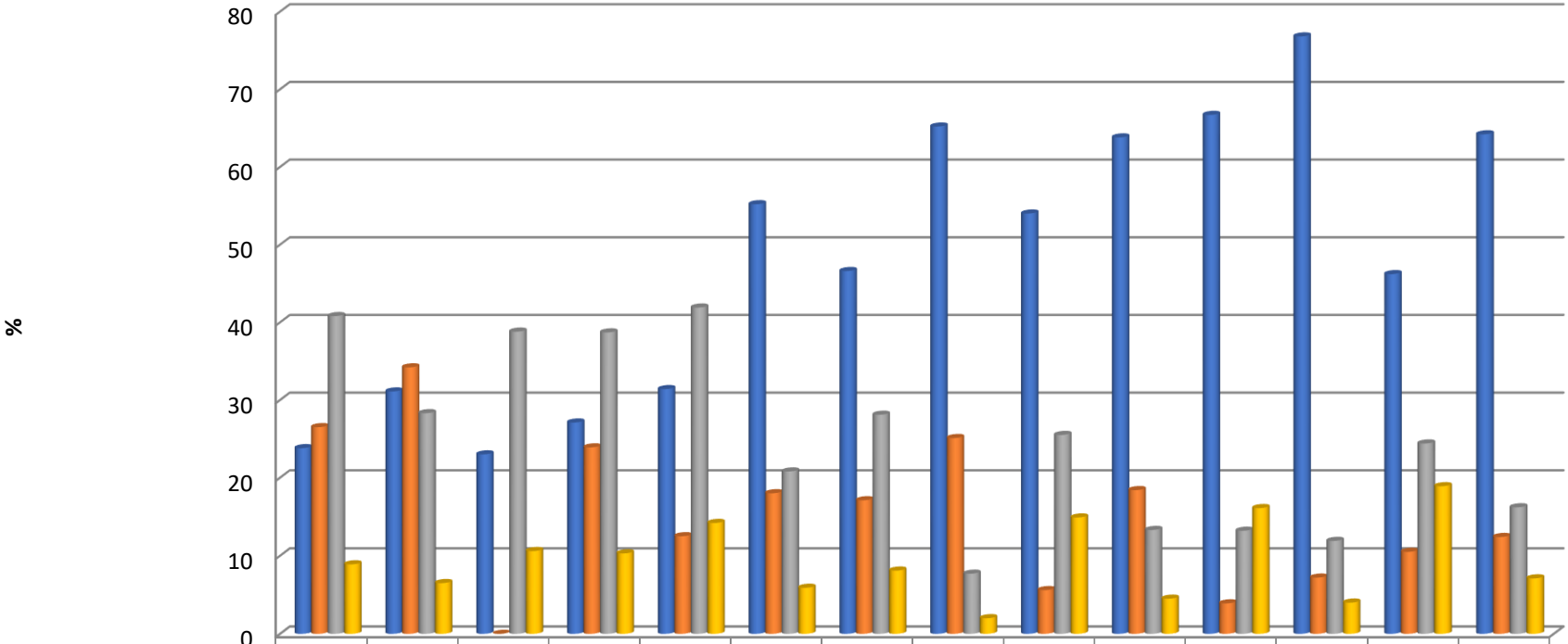


	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment
	2014		2015		2016		2017		2018		2019		2020	
No Anxiety	56.7	77.6	65.4	85.1	55.7	73.2	46.6	62.3	46.9	59.2	57.2	68.5	61.6	74.2
Mild Anxiety	13.7	15.8	17.2	12.2	15.5	18	19.4	34.3	12.4	29.8	11.8	19.1	17.2	18
Moderate Anxiety	22.4	5.3	12.7	2.4	24.9	8.5	29.5	3.1	31.7	10	20.2	9.6	14.5	6.9
Severe Anxiety	7.2	1.2	4.7	0.3	3.9	0.3	4.5	0.3	9	1	10.7	2.8	6.7	0.9

Fig. 10: Pre and Post treatment Anxiety

Table 11: Pre and Post treatment Wellbeing

Year	ESAS	Best feeling Wellbeing	Mild decline in Wellbeing	Moderate decline in Wellbeing	Severe decline in Wellbeing	min ... max	Mean ± SD	Median (P25 - P75)	p value
2014	Pre treatment	80 (23.8)	89 (26.5)	137 (40.8)	30 (8.9)	0 ... 10	3.34 ± 2.44	3 (1 - 5)	<0.001
	Post treatment	100 (31.1)	110 (34.2)	91 (28.3)	21 (6.5)	0 ... 10	2.73 ± 2.37	3 (0 - 5)	
2015	Pre treatment	87 (23.0)	105 (27.7)	147 (38.8)	40 (10.6)	0 ... 10	3.5 ± 2.45	3 (2 - 5)	0.787
	Post treatment	102 (27.1)	90 (23.9)	146 (38.7)	39 (10.3)	0 ... 10	3.45 ± 2.58	3 (0 - 5)	
2016	Pre treatment	113 (31.4)	45 (12.5)	151 (41.9)	51 (14.2)	0 ... 10	3.6 ± 2.81	4 (0 - 6)	<0.001
	Post treatment	196 (55.2)	64 (18.0)	74 (20.8)	21 (5.9)	0 ... 10	2.01 ± 2.53	0 (0 - 4)	
2017	Pre treatment	166 (46.6)	61 (17.1)	100 (28.1)	29 (8.1)	0 ... 10	2.55 ± 2.69	3 (0 - 5)	<0.001
	Post treatment	229 (65.2)	88 (25.1)	27 (7.7)	7 (2.0)	0 ... 10	1.23 ± 1.93	0 (0 - 3)	
2018	Pre treatment	174 (54.0)	18 (5.6)	82 (25.5)	48 (14.9)	0 ... 10	2.62 ± 3.16	0 (0 - 5)	<0.001
	Post treatment	197 (63.8)	57 (18.4)	41 (13.3)	14 (4.5)	0 ... 9	1.47 ± 2.23	0 (0 - 3)	
2019	Pre treatment	323 (66.7)	19 (3.9)	64 (13.2)	78 (16.1)	0 ... 10	2.15 ± 3.33	0 (0 - 5)	<0.001
	Post treatment	361 (76.8)	34 (7.2)	56 (11.9)	19 (4.0)	0 ... 10	1.08 ± 2.14	0 (0 - 0)	
2020	Pre treatment	220 (46.2)	50 (10.5)	116 (24.4)	90 (18.9)	0 ... 10	3.11 ± 3.34	3 (0 - 6)	<0.001
	Post treatment	289 (64.2)	56 (12.4)	73 (16.2)	32 (7.1)	0 ... 10	1.7 ± 2.6	0 (0 - 3)	
Overall	**Pre treatment**	**1163 (42.9)**	**387 (14.3)**	**797 (29.4)**	**366 (13.5)**	**0 ... 10**	**2.96 ± 2.99**	**3 (0 - 5)**	**<0.001**
	Post treatment	**1474 (56.0)**	**499 (18.9)**	**508 (19.3)**	**153 (5.8)**	**0 ... 10**	**1.92 ± 2.49**	**0 (0 - 4)**	

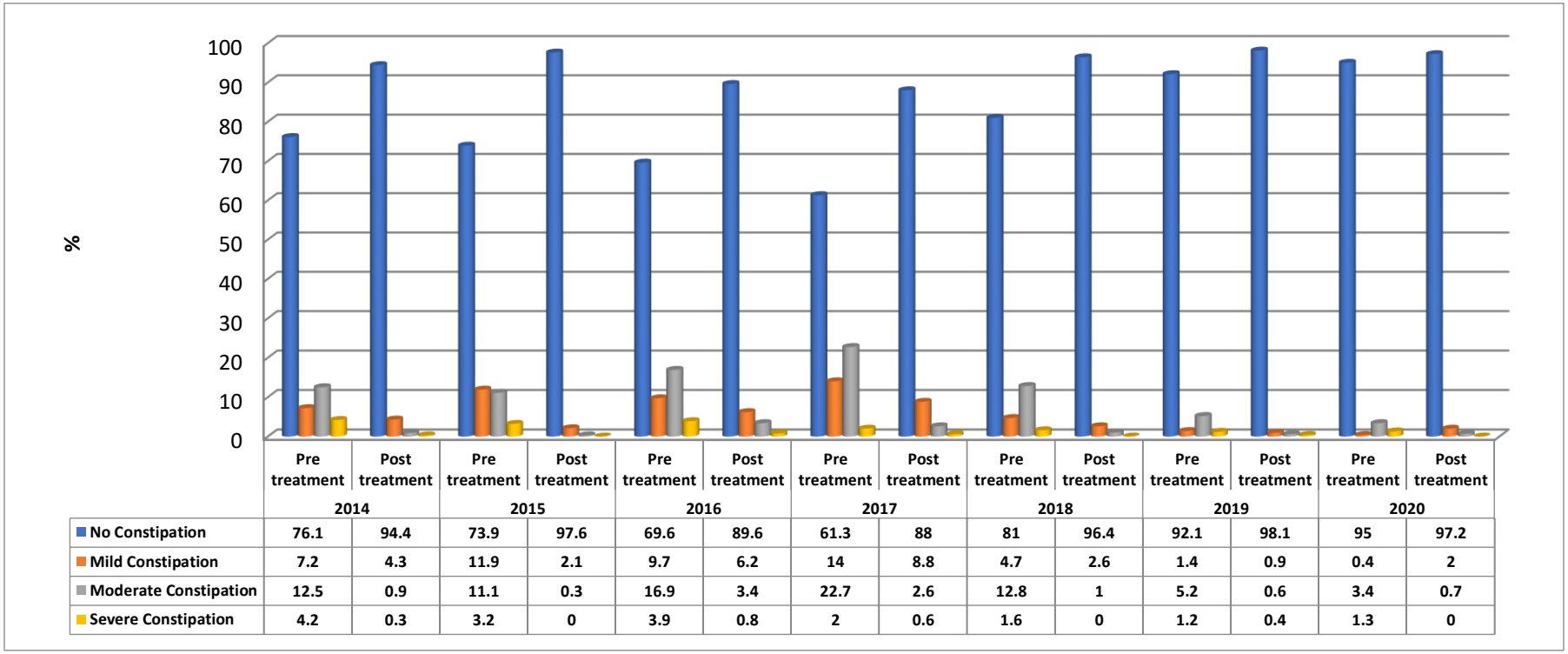


	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment
	2014		2015		2016		2017		2018		2019		2020	
Best feeling wellbeing	23.8	31.1	23	27.1	31.4	55.2	46.6	65.2	54	63.8	66.7	76.8	46.2	64.2
Mild decline in Wellbeing	26.5	34.2	0	23.9	12.5	18	17.1	25.1	5.6	18.4	3.9	7.2	10.5	12.4
Moderate decline in Wellbeing	40.8	28.3	38.8	38.7	41.9	20.8	28.1	7.7	25.5	13.3	13.2	11.9	24.4	16.2
Severe decline in Wellbeing	8.9	6.5	10.6	10.3	14.2	5.9	8.1	2	14.9	4.5	16.1	4	18.9	7.1

Fig. 11: Pre and Post treatment Wellbeing

Table 12: Pre and Post treatment Constipation

Year	ESAS	No **Constipation**	Mild **Constipation**	Moderate **Constipation**	Severe **Constipation**	min ... max	Mean ± SD	Median (P25 - P75)	p value
2014	Pre treatment	255 (76.1)	24 (7.2)	42 (12.5)	14 (4.2)	0 ... 9	1.1 ± 2.17	0 (0 - 0)	<0.001
	Post treatment	304 (94.4)	14 (4.3)	3 (.9)	1 (.3)	0 ... 8	0.16 ± 0.78	0 (0 - 0)	
2015	Pre treatment	280 (73.9)	45 (11.9)	42 (11.1)	12 (3.2)	0 ... 8	1.1 ± 2	0 (0 - 3)	<0.001
	Post treatment	368 (97.6)	8 (2.1)	1 (.3)	0 (0.0)	0 ... 4	0.06 ± 0.4	0 (0 - 0)	
2016	Pre treatment	252 (69.6)	35 (9.7)	61 (16.9)	14 (3.9)	0 ... 8	1.32 ± 2.17	0 (0 - 3)	<0.001
	Post treatment	318 (89.6)	22 (6.2)	12 (3.4)	3 (.8)	0 ... 8	0.38 ± 1.21	0 (0 - 0)	
2017	Pre treatment	219 (61.3)	50 (14.0)	81 (22.7)	7 (2.0)	0 ... 10	1.66 ± 2.25	0 (0 - 3)	<0.001
	Post treatment	309 (88.0)	31 (8.8)	9 (2.6)	2 (.6)	0 ... 8	0.4 ± 1.2	0 (0 - 0)	
2018	Pre treatment	260 (81.0)	15 (4.7)	41 (12.8)	5 (1.6)	0 ... 8	0.89 ± 1.92	0 (0 - 0)	<0.001
	Post treatment	298 (96.4)	8 (2.6)	3 (1.0)	0 (0.0)	0 ... 5	0.11 ± 0.63	0 (0 - 0)	
2019	Pre treatment	446 (92.1)	7 (1.4)	25 (5.2)	6 (1.2)	0 ... 10	0.39 ± 1.44	0 (0 - 0)	<0.001
	Post treatment	461 (98.1)	4 (.9)	3 (.6)	2 (.4)	0 ... 7	0.08 ± 0.63	0 (0 - 0)	
2020	Pre treatment	453 (95.0)	2 (.4)	16 (3.4)	6 (1.3)	0 ... 10	0.28 ± 1.3	0 (0 - 0)	0.001
	Post treatment	438 (97.3)	9 (2.0)	3 (.7)	0 (0.0)	0 ... 5	0.08 ± 0.54	0 (0 - 0)	
Overall	**Pre treatment**	**2165 (79.7)**	**178 (6.6)**	**308 (11.3)**	**64 (2.4)**	**0 ... 10**	**0.91 ± 1.94**	**0 (0 - 0)**	**<0.001**
	Post treatment	**2496 (94.8)**	**96 (3.6)**	**34 (1.3)**	**8 (.3)**	**0 ... 8**	**0.18 ± 0.82**	**0 (0 - 0)**	

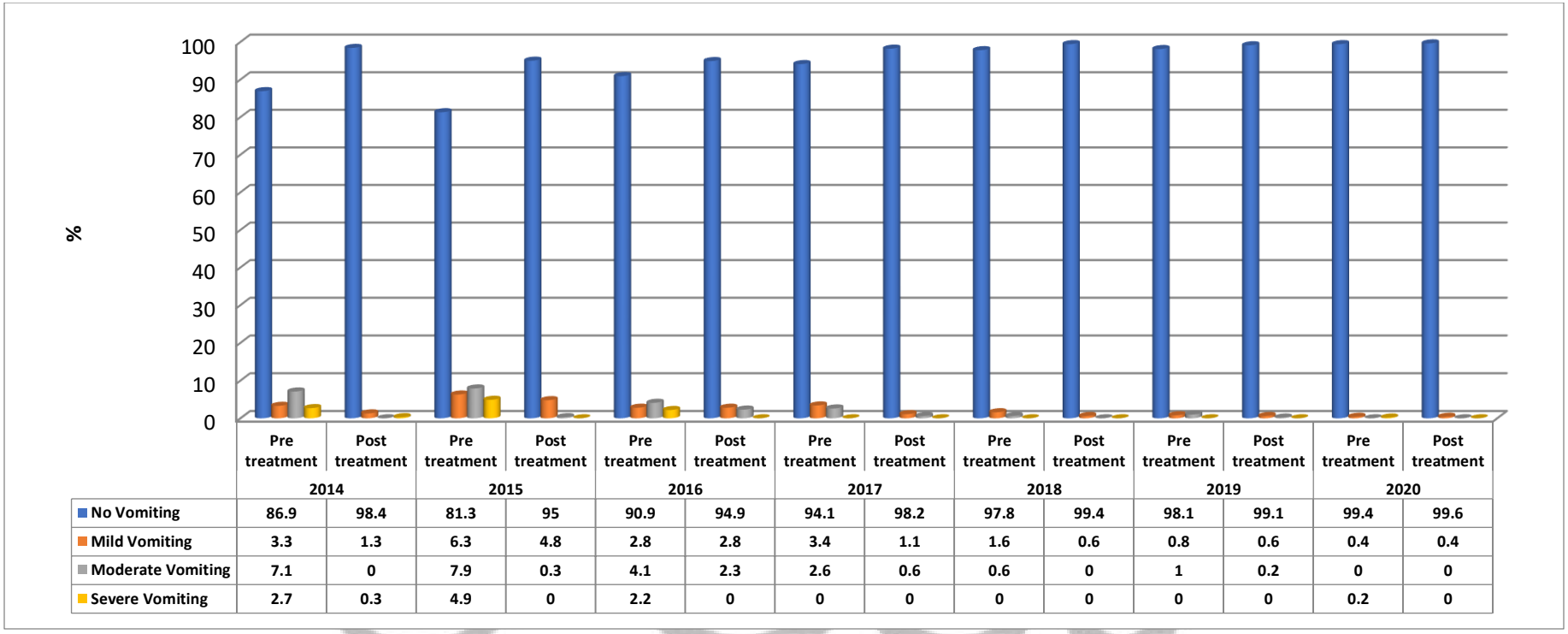


	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment
	2014		2015		2016		2017		2018		2019		2020	
No Constipation	76.1	94.4	73.9	97.6	69.6	89.6	61.3	88	81	96.4	92.1	98.1	95	97.2
Mild Constipation	7.2	4.3	11.9	2.1	9.7	6.2	14	8.8	4.7	2.6	1.4	0.9	0.4	2
Moderate Constipation	12.5	0.9	11.1	0.3	16.9	3.4	22.7	2.6	12.8	1	5.2	0.6	3.4	0.7
Severe Constipation	4.2	0.3	3.2	0	3.9	0.8	2	0.6	1.6	0	1.2	0.4	1.3	0

Fig. 12: Pre and Post treatment Constipation

Table 13: Pre and Post treatment vomiting

Year	ESAS	No **Vomiting**	Mild **Vomiting**	Moderate **Vomiting**	Severe **Vomiting**	min ... max	Mean ± SD	Median (P25 - P75)	p value
2014	Pre treatment	292 (86.9)	11 (3.3)	24 (7.1)	9 (2.7)	0 ... 9	0.65 ± 1.81	0 (0 - 0)	<0.001
	Post treatment	315 (98.4)	4 (1.3)	0 (0.0)	1 (.3)	0 ... 7	0.04 ± 0.44	0 (0 - 0)	
2015	Pre treatment	308 (81.3)	24 (6.3)	30 (7.9)	17 (4.5)	0 ... 9	0.89 ± 2.02	0 (0 - 0)	<0.001
	Post treatment	358 (95.0)	18 (4.8)	1 (.3)	0 (0.0)	0 ... 5	0.11 ± 0.5	0 (0 - 0)	
2016	Pre treatment	329 (90.9)	10 (2.8)	15 (4.1)	8 (2.2)	0 ... 10	0.48 ± 1.64	0 (0 - 0)	<0.001
	Post treatment	337 (94.9)	10 (2.8)	8 (2.3)	0 (0.0)	0 ... 6	0.18 ± 0.83	0 (0 - 0)	
2017	Pre treatment	336 (94.1)	12 (3.4)	9 (2.5)	0 (0.0)	0 ... 6	0.21 ± 0.88	0 (0 - 0)	0.003
	Post treatment	344 (98.3)	4 (1.1)	2 (.6)	0 (0.0)	0 ... 5	0.05 ± 0.43	0 (0 - 0)	
2018	Pre treatment	313 (97.8)	5 (1.6)	2 (.6)	0 (0.0)	0 ... 5	0.08 ± 0.51	0 (0 - 0)	0.016
	Post treatment	307 (99.4)	2 (.6)	0 (0.0)	0 (0.0)	0 ... 2	0.01 ± 0.13	0 (0 - 0)	
2019	Pre treatment	475 (98.1)	4 (.8)	5 (1.0)	0 (0.0)	0 ... 5	0.07 ± 0.56	0 (0 - 0)	0.01
	Post treatment	466 (99.1)	3 (.6)	1 (.2)	0 (0.0)	0 ... 6	0.03 ± 0.33	0 (0 - 0)	
2020	Pre treatment	474 (99.4)	2 (.4)	0 (0.0)	1 (.2)	0 ... 8	0.03 ± 0.41	0 (0 - 0)	0.18
	Post treatment	448 (99.6)	2 (.4)	0 (0.0)	0 (0.0)	0 ... 3	0.01 ± 0.17	0 (0 - 0)	
Overall	**Pre treatment**	**2527 (93.1)**	**68 (2.5)**	**85 (3.1)**	**35 (1.3)**	**0 ... 10**	**0.32 ± 1.28**	**0 (0 - 0)**	**<0.001**
	Post treatment	**2575 (97.9)**	**43 (1.6)**	**12 (.5)**	**1 (.0)**	**0 ... 7**	**0.06 ± 0.45**	**0 (0 - 0)**	

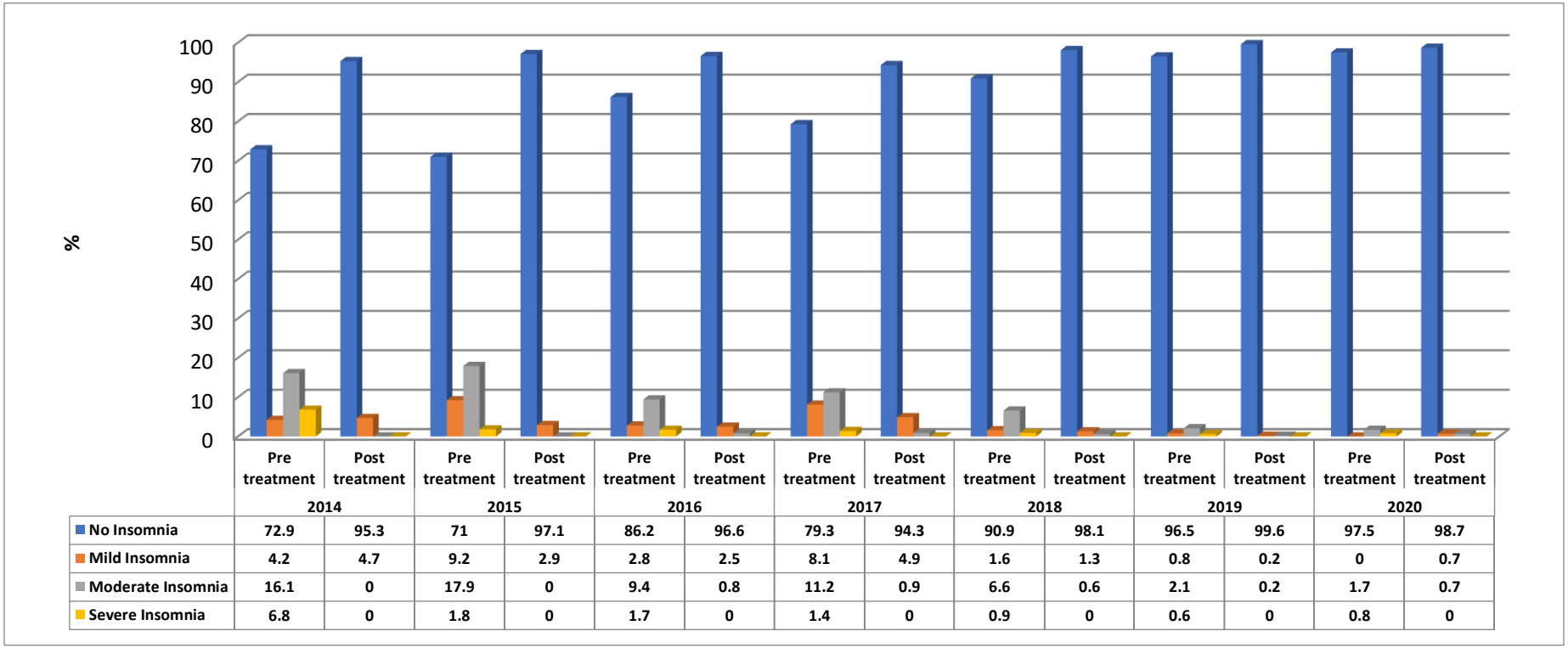


	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment
	2014		2015		2016		2017		2018		2019		2020	
No Vomiting	86.9	98.4	81.3	95	90.9	94.9	94.1	98.2	97.8	99.4	98.1	99.1	99.4	99.6
Mild Vomiting	3.3	1.3	6.3	4.8	2.8	2.8	3.4	1.1	1.6	0.6	0.8	0.6	0.4	0.4
Moderate Vomiting	7.1	0	7.9	0.3	4.1	2.3	2.6	0.6	0.6	0	1	0.2	0	0
Severe Vomiting	2.7	0.3	4.9	0	2.2	0	0	0	0	0	0	0	0.2	0

Fig. 13: Pre and Post treatment vomiting

Table 14: Pre and Post treatment Insomnia

Year	ESAS	No **Insomnia**	Mild **Insomnia**	Moderate **Insomnia**	Severe **Insomnia**	min ... max	Mean ± SD	Median (P25 - P75)	p value
2014	Pre treatment	245 (72.9)	14 (4.2)	54 (16.1)	23 (6.8)	0 ... 10	1.46 ± 2.56	0 (0 - 3)	<0.001
	Post treatment	306 (95.3)	15 (4.7)	0 (0.0)	0 (0.0)	0 ... 3	0.09 ± 0.42	0 (0 - 0)	
2015	Pre treatment	269 (71.0)	35 (9.2)	68 (17.9)	7 (1.8)	0 ... 8	1.23 ± 2.03	0 (0 - 3)	<0.001
	Post treatment	364 (97.1)	11 (2.9)	0 (0.0)	0 (0.0)	0 ... 3	0.05 ± 0.33	0 (0 - 0)	
2016	Pre treatment	312 (86.2)	10 (2.8)	34 (9.4)	6 (1.7)	0 ... 10	0.64 ± 1.7	0 (0 - 0)	<0.001
	Post treatment	342 (96.6)	9 (2.5)	3 (.8)	0 (0.0)	0 ... 4	0.09 ± 0.53	0 (0 - 0)	
2017	Pre treatment	283 (79.3)	29 (8.1)	40 (11.2)	5 (1.4)	0 ... 8	0.9 ± 1.88	0 (0 - 0)	<0.001
	Post treatment	329 (94.3)	17 (4.9)	3 (.9)	0 (0.0)	0 ... 5	0.16 ± 0.68	0 (0 - 0)	
2018	Pre treatment	291 (90.9)	5 (1.6)	21 (6.6)	3 (.9)	0 ... 10	0.45 ± 1.52	0 (0 - 0)	<0.001
	Post treatment	303 (98.1)	4 (1.3)	2 (.6)	0 (0.0)	0 ... 5	0.06 ± 0.48	0 (0 - 0)	
2019	Pre treatment	467 (96.5)	4 (.8)	10 (2.1)	3 (.6)	0 ... 8	0.16 ± 0.9	0 (0 - 0)	<0.001
	Post treatment	468 (99.6)	1 (.2)	1 (.2)	0 (0.0)	0 ... 4	0.01 ± 0.21	0 (0 - 0)	
2020	Pre treatment	463 (97.5)	0 (0.0)	8 (1.7)	4 (.8)	0 ... 10	0.15 ± 0.98	0 (0 - 0)	0.008
	Post treatment	444 (98.7)	3 (.7)	3 (.7)	0 (0.0)	0 ... 5	0.05 ± 0.47	0 (0 - 0)	
Overall	**Pre treatment**	**2330 (85.9)**	**97 (3.6)**	**235 (8.7)**	**51 (1.9)**	**0 ... 10**	**0.66 ± 1.74**	**0 (0 - 0)**	**<0.001**
	Post treatment	**2556 (97.3)**	**60 (2.3)**	**12 (.5)**	**0 (0.0)**	**0 ... 5**	**0.07 ± 0.46**	**0 (0 - 0)**	



	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment
	2014		2015		2016		2017		2018		2019		2020	
No Insomnia	72.9	95.3	71	97.1	86.2	96.6	79.3	94.3	90.9	98.1	96.5	99.6	97.5	98.7
Mild Insomnia	4.2	4.7	9.2	2.9	2.8	2.5	8.1	4.9	1.6	1.3	0.8	0.2	0	0.7
Moderate Insomnia	16.1	0	17.9	0	9.4	0.8	11.2	0.9	6.6	0.6	2.1	0.2	1.7	0.7
Severe Insomnia	6.8	0	1.8	0	1.7	0	1.4	0	0.9	0	0.6	0	0.8	0

Fig . 14: Pre and Post treatment Insomnia

Table 15: Pain Intensity with regard to Age, Gender, Dyspnea, Anorexia and PPS

Characteristic	Description	No pain	Mild pain	Moderate pain	Severe pain	Total	p value
		371 (13.6)	**349 (12.8)**	**912 (33.5)**	**1091 (40.1)**	**2952 (100.0)**	
Age (year)	≤ 18	12 (9.8)	14 (11.4)	33 (26.8)	64 (52.0)	123 (4.5)	<0.001
	19- 44	48 (8.4)	50 (8.7)	178 (31.1)	297 (51.8)	573 (21.1)	
	46 - 65	156 (12.8)	169 (13.8)	411 (33.6)	486 (39.8)	1222 (45.0)	
	65+	155 (19.5)	111 (13.9)	290 (36.4)	240 (30.2)	796 (29.3)	
Gender	Female	160 (11.1)	181 (12.6)	506 (35.1)	595 (41.3)	1442 (53.0)	<0.001
	Male	210 (16.4)	168 (13.2)	406 (31.8)	493 (38.6)	1277 (47.0)	
Shortness of Breath (Dyspnea)	no symptom	265 (15.2)	220 (12.6)	546 (31.3)	715 (41.0)	1746 (64.3)	<0.001
	mild	29 (6.9)	64 (15.2)	163 (38.6)	166 (39.3)	422 (15.5)	
	moderate	43 (12.5)	40 (11.6)	143 (41.4)	119 (34.5)	345 (12.7)	
	severe	31 (15.3)	24 (11.9)	57 (28.2)	90 (44.6)	202 (7.4)	
Loss of appetite (Anorexia)	no symptom	107 (19.0)	76 (13.5)	171 (30.3)	210 (37.2)	564 (20.8)	<0.001
	mild	42 (11.7)	41 (11.4)	114 (31.8)	162 (45.1)	359 (13.2)	
	moderate	108 (11.5)	112 (11.9)	363 (38.7)	355 (37.8)	938 (34.5)	
	severe	111 (13.0)	120 (14.0)	261 (30.5)	363 (42.5)	855 (31.5)	
PPS (Mean ± SD)	**Pre treatment**	**40.08 ± 13.17**	**43.12 ± 13.82**	**43.47 ± 13.11**	**44.48 ± 13.72**	**43.37 ± 13.53**	**<0.001**
	Post treatment	**37.7 ± 13.24**	**42.61 ± 13.68**	**43.63 ± 12.8**	**46.7 ± 13.39**	**43.95 ± 13.52**	**<0.001**

Table 15A: Pain Intensity with regard to Age, Gender, Dyspnea, Anorexia and ESAS

Characteristic	Description	no pain	mild pain	moderate pain	severe pain	Total	p value
		371 (13.6)	**349 (12.8)**	**912 (33.5)**	**1091 (40.1)**	**2952 (100.0)**	
Age (year)	≤ 18	12 (3.2)	14 (4.1)	33 (3.6)	64 (5.9)	123 (4.5)	<0.001
	19- 44	48 (12.9)	50 (14.5)	178 (19.5)	297 (27.3)	573 (21.1)	
	46 - 65	156 (42.0)	169 (49.1)	411 (45.1)	486 (44.7)	1222 (45.0)	
	65+	155 (41.8)	111 (32.3)	290 (31.8)	240 (22.1)	796 (29.3)	
Gender	Female	160 (43.2)	181 (51.9)	506 (55.5)	595 (54.7)	1442 (53.0)	<0.001
	Male	210 (56.8)	168 (48.1)	406 (44.5)	493 (45.3)	1277 (47.0)	
Shortness of Breath (Dyspnea)	no symptom	265 (72.0)	220 (63.2)	546 (60.1)	715 (65.6)	1746 (64.3)	<0.001
	mild	29 (7.9)	64 (18.4)	163 (17.9)	166 (15.2)	422 (15.5)	
	moderate	43 (11.7)	40 (11.5)	143 (15.7)	119 (10.9)	345 (12.7)	
	severe	31 (8.4)	24 (6.9)	57 (6.3)	90 (8.3)	202 (7.4)	
Loss of appetite (Anorexia)	no symptom	107 (29.1)	76 (21.8)	171 (18.8)	210 (19.3)	564 (20.8)	<0.001
	mild	42 (11.4)	41 (11.7)	114 (12.5)	162 (14.9)	359 (13.2)	
	moderate	108 (29.3)	112 (32.1)	363 (39.9)	355 (32.6)	938 (34.5)	
	severe	111 (30.2)	120 (34.4)	261 (28.7)	363 (33.3)	855 (31.5)	
PPS (Mean ± SD)	**Pre treatment**	**40.08 ± 13.17**	**43.12 ± 13.82**	**43.47 ± 13.11**	**44.48 ± 13.72**	**43.37 ± 13.53**	**<0.001**
	Post treatment	**37.7 ± 13.24**	**42.61 ± 13.68**	**43.63 ± 12.8**	**46.7 ± 13.39**	**43.95 ± 13.52**	**<0.001**

Chapter – IV (Discussion):

Socio-demographic information

The present study aimed to aim of this study is to find out the difference between pain intensity in advanced cancer patients before and after receiving palliative in King Fahad Medical City (K.F.M.C) in Riyadh[17].

Disease progression is often accompanied by a variety of symptoms. These symptoms may have different origins[25]. For example, one patient may have pain caused by the disease itself, fatigue caused by treatment, and lack of sleep caused by anxiety. Symptom assessment should be performed when patients are seen in outpatient facilities or on admission. This assessment aids the physician in making an appropriate treatment plan.

This study showed that a numberof 2952 patients were evaluated for the effectiveness of palliative care services to control cancer pain in King Fahad Medical City based in a retrospective data from the year 2014 to the year 2020. The average mean total age was found to be (54.62±18.85) years. The average median age was 57 (44 - 68) years. In terms of gender female was predominance (53% vs.47%) with female to male ratio of 1.1:1. Similar finding showed that the mean /median age was 62.8 /63 (37 –91) and female to male was (56% vs. 44%) with female to male ratio of 1:3:1[26] .

The vast majority of patients were Saudi (96.2%) versus 3.8% non-Saudi patients. This finding not away from Saudi Arabia report on the Incidence of cancer (2015) that reported from a total of 15,542 cases were analyzed, of which 12,038 (77.5%)[27].

Common types of cancers diagnosed

On the other hand, the study showed that most common cancers types diagnosed were gastrointestinal cancer (33.0%), followed by genitourinary cancer (15.7%), breast (10.8%), brain and CNS (9.2%), head and neck cancer (8.7%), lung (6.8%), bone cancer (4.7%) and other cancers (4.7%). This may be because many risk factors have been implicated in the etiology of cancer including; tobacco and alcohol consumption, unhealthy diet, physical inactivity, viral infection, bacterial infection, urban air pollution, ionizing radiation and indoor smoke [28,29].

While unknown diagnosis was representing (.1%). Previous comparable literature from Saudi Arabia showed that breast cancer is leading cancer in Saudi Arabia (14.8%), colorectal cancer ranked the third most common cancer in Saudi Arabia with an incidence and mortality rate of (14.6%),thyroid cancer ranked the third most common cancer in Saudi Arabia with an incidence and mortality rate of (10.1%) [30].

Coding status

In terms of coding status, the study showed that, almost more than half of the patients (50.3%) Do Not Resuscitate (DNR) while 49.7% were provided with full code (all medical procedures to be utilized in attempt to restart a heartbeat and/or breathing). In line comparable study showed that among 407 patients completed the questionnaire: 27% identified as DNR, 24% as FC [31].

Pre and post Palliative Performance Scale (PPS)

The study showed that the overall pre and Post treatment Palliative Performance Scale (PPS) showed no significance differences during the different years (p=.166) with the mean of Palliative Performance Scale (PPS) not significantly increased at post treatment from (43.35) to (43.93) by per cent increased of 1.3 only with

median of 40.However,the Palliative Performance Scale (PPS) is a modification of the Karnofsky Performance Scale (KPS), designed specifically for measurement of physical status in Palliative Care [32]. Using thePalliative Performance Scale, only about 10% of patients with a score of 50% or less would beexpected to survive more than 6 months [33].There are few studies investigating prognosis of advancedcancer patients with rapid declining performance status.Studies are rather focused on associations between intractablesymptoms and poor prognosis [34, 35].

Pre and Post treatment ESAS for Pain

The study showed that there were significant reductions in pain when using ESAS tool for evaluation by (30%) ,tiredness (25.2%), drowsiness (45.4%) , nausea (57.6%), loss of appetite (40%), shortness of breath (SOB) (46.1%), depression (65%), anxiety (54.9%),wellbeing (35.1%) , constipation (9.9%) and vomiting (81.25%) and insomnia (89.4%).

In our study, the top five symptoms (symptomprevalence more or equal 50%) were nausea,depression, anxiety, vomiting and insomnia. This may be because several factors such as the type of cancer, the treatment option impacted the prevalence of anxiety and depression among cancer patients. Also, cancer treatments that entail chemotherapy may induce depression through specific biological mechanisms, also used of chemotherapy may cause and anxiety and depression and induced vomiting. Similar findings stated that In cancer patients, psychological problems such as depression and anxiety persist and can cause an additional burden during their treatment, making it more challenging in terms of its management and control [36, 37], compliance during the treatment course

[37].Also, similar previous studies have reported that the prevalence of depressive disorders among cancer patients is two to three times higher than those of the general population [38] . In addition our study in line with previous studies that evaluated psychological distress among cancer patients have reported various heterogeneous prevalence rates that differed according to clinical settings (outpatient clinics, hospital settings, and palliative care), stage of the disease (newly diagnosed, recurrence, survivorship, or advanced stages), and phase of treatment[39,40] , which ranged between 5.0 and 49.0%[36]. The use of chemotherapy-induced nausea and vomiting (CINV) medications, as well as steroids, are a mainstay for the prevention and treatment of CINV [41]and, consequently, contribute to the high prevalence of anxiety and depression among cancer patients.

A series of studies supported our study findings such as study on patients with head and neck cancer undergoing radiation treatment showed dysphoria and depression ranging from 7.3% to 12.1% at the beginning of the treatment, and from 9.7% to 21.9% in the end, suggesting a great impact of the disease and treatment on emotional aspects[42]. Pain and fatigue (tiredness) are the most prevalent symptoms in cancer patients. Regarding these data, a study that evaluated over 3,000 patients with various types of cancer showed that 67% reported some kind of pain or need for analgesic drugs at the beginning of the treatment and of these, 33% were not receiving adequate analgesia [43].

In 2016, the World Health Organization (WHO) estimated that about 90% of cases of pain in patients with cancer could be controlled with simple interventions [44]. However, many studies indicate that pain management for these patients is

still difficult.Fatigue (tiredness) is reported by 50% to 90% of patients, impairing their quality of life and functioning[45]. A study on women with breast cancer, in the state of São Paulo, Brazil, showed that 70.9% of evaluated patients had symptoms of depression and 71% presented fatigue (tiredness) [46].

Another study that evaluated women with breast cancer identified clinically relevant fatigue (tiredness) (> 4 intensity) in 31.9% of women, and this symptom was associated with pain and depression [47]. In patients with colorectal cancer, fatigue occurred in 26.8% and predictors were: depression impaired functioning and sleeps disorders[48].However, nausea and vomiting are also common in patients undergoing chemotherapy. A Brazilian study that evaluated women with breast cancer undergoing chemotherapy indicated that 93% of them presented nausea and 87% had at least one episode of vomiting during treatment [49]. Constipation and diarrhea also occur in patients treated with chemotherapy and radiation therapy [50, 51].

Statistical association of socio-demographic and performance measurements scale

Furthermore, the study showed thatthere was association between patients age and intensity of pain, P<.001. Severe pain among cancer patients was significantly high among age group less or equal 18 years old (52%) followed by the age group 19-44 years (51.8%).There was association between patients age and intensity of pain, p<0.001. The severity of pain was significantly greater among patients aged 46-65 years old (44.7%). The literature on age differences in cancer pain is scarce and conflicting with several studies finding no differences and a few studies finding that older adults report less pain than younger adults[52, 53]. It is critical

to understand pain in older cancer survivors, as greater than 60% of new cancers occur in people aged 65 and older [54].However, reports of pain vary widely, between 20 and 85% of older adults following cancer [52, 53].

In terms of gender there was significant differences between male and female regard intensity of pain, $p<0.001$. Severity of pain among cancer patients was significantly high among female (41.3%) compared to male (30.2%). In terms of gender, the severity of pain was significantly high among female (54.7%) compared to male (45.3%). Similar finding showed that Females reported poorer scores than males for nausea (2.6 vs. 2.2, $p = 0.02$) [55].

Moreover, the study showed the severity of pain was significantly associated with patients with severe shortness of breath (dyspnea) (44.6%). Also, the severity of pain was significantly reported among cancer patients with no symptoms of SOB (65.6%). Other study showed that there wassignificant improvements in breathlessness mastery in the breathlessness support service group compared with the control group (mean difference, 0.58; 95% CI, 0.01 to 1.15), as well as improvements in overall survival for patients with chronic obstructive pulmonary disease and interstitial lung disease but not cancer[56].

The loss of appetite (Anorexia) was significantly reported among cancer patients with severe loss of appetite (Anorexia) (33.3%).Hence, the loss of appetite (Anorexia) was significantly found high among patients with mild loss of appetite (45.1%) followed by severe one (42.5%).Loss of appetite is common in cancer patients and can occur, among other factors, due to changes in the central nervous system and peripheral neurohormonal signs that govern appetite[57]. However different previous studies in line with our study findings showed that the

incidence rates in patients with advanced cancer can range from 39.0% to 81.5% for weight loss and 30.0% to 80.0% for anorexia [58]. Lack of appetite was reported by 80.0% of patients in palliative care[59]. This variation reflects conditioning factors such as distinct assessment patterns, selection of different clinical populations (stages of cancer) and inconsistent methodologies including retrospective analysis of medical records, cross-sectional assessments and longitudinal designs as stated by the author.Also there is an association between lack of appetite and radiotherapy. In patients with head and neck cancer, the amount of irradiation was related to the worsening of appetite. At 20 Gy of radiation, a lack of appetite was associated with lower sensitivity to taste. With a higher frequency (50 Gy), lack of appetite was associated with oral mucositis, dry mouth, low saliva production in the morning, reduction in taste sensitivity, analgesic use and frequency of oral care [59]. In addition, loss of appetite was present in 64.0% of patients with gastroesophageal cancer. The highest intensity of appetite loss was associated with tumor size, staging, the impossibility of surgical treatment, weight loss, and dysphagia[60]. Similarly, in esophageal cancer patients, there is an association between loss of appetite and worse survival rates[61].

Conclusion and Recommendations

Conclusion

Based on the study objectives it can be concluded that;

- The Palliative interventions tailored for symptoms to control pain were more prominent in reducing of nausea, depression, anxiety, vomiting and insomniaafter 48 hours.
- No significant difference in control of pain during pre and after treatment of pain ($p>0.05$). However the mean scale of pain was 43.35 in pre treatment and 43.93 during post palliative treatment. The mean difference was only 1.3% with median of 40. This finding is less than 10% of patients with a score of 50% which indicated that the prognosis of advanced cancer patients with rapid declining performance status.
- In patients with advanced cancers, symptom patterns differ according to age and gender.
- The prevalence of the pain among palliative care patients in (K.F.M.C) In accordance to ESAS scale showed significant reduction in terms of pain by 30%, tiredness (fatigue) (25.2%), drowsiness (45.4%) , nausea (57.6%), loss of appetite (40%), shortness of breath (SOB) (46.1%), depression (65%), anxiety (54.9%), wellbeing (35.1%) , constipation (9.9%) and vomiting (81.25%) and insomnia (89.4%) with the top five symptoms (symptom prevalence more or equal 50%) were nausea, depression, anxiety, vomiting and insomnia.
- There were significant associations between pain intensity with regard to age, gender, dyspnea, anorexia for evaluation of the effectiveness of palliative care services to control cancer pain.

Recommendations

The current study recommends the following based on the study findings;

1. Educational interventions about pain and treatment shouldoccur immediately after diagnosis, and pain should berecognized and treated promptly, using one of the availableguidelines.
2. The nurses often have the closest contact withpatients; they are the ones who can have greatest impact ontheir adherence to treatment plans, while developing patients'roles in treatment decisions.
3. Patient's ideas, beliefs andexperiences regarding pain and analgesic treatments mustbe explored.
4. There is a need to examine health careprofessionals' reluctance to seriously assess patients' cancer-related pain from the beginning of the disease, as well as toadhere to available guidelines and treatment plans.

References:

[1] World Health Organization, “Facts Palliative,” pp. 1–35, 2004.

[2] S. A. Robertson, “What is pain?,” *Journal of the American Veterinary Medical Association*, vol. 221, no. 2. pp. 202–205, 2002, doi: 10.2460/javma.2002.221.202.

[3] A. Santos-Longhurst, “Types of Pain: Classifications and Examples to Help Describe Your Pain.” 2018, Accessed: Feb. 21, 2021. [Online]. Available: https://www.healthline.com/health/types-of-pain#acute-pain.

[4] “Palliative care - Cancer Council Australia.” https://www.cancer.org.au/cancer-information/treatment/palliative-care (accessed Nov. 13, 2021).

[5] A. Mohiuddin, *Non-Drug Pain Management : Opportunities to Explore ISBN : 978-1-946628-01-5*, no. May. 2019.

[6] “American Academy of Pediatrics. Palliative care for children,” *Pediatrics*, vol. 106, no. 2, p. 351, 2000, Accessed: Feb. 19, 2021. [Online]. Available: www.aappublications.org/news.

[7] E. J. Murphy, “Acute pain management pharmacology for the patient with concurrent renal or hepatic disease,” *Anaesth. Intensive Care*, vol. 33, no. 3, pp. 311–322, 2005, doi: 10.1177/0310057x0503300306.

[8] B. H. McCarberg, B. D. Nicholson, K. H. Todd, T. Palmer, and L. Penles, “The impact of pain on quality of life and the unmet needs of pain management: Results from pain sufferers and physicians participating in an internet survey,” *Am. J. Ther.*, vol. 15, no. 4, pp. 312–320, Jul. 2008, doi: 10.1097/MJT.0b013e31818164f2.

[9] O. Al-Zahrani, A. Eldali, and M. Z. Al-Shahri, “Prevalence and severity of pain in cancer patients in an outpatient palliative care setting in Saudi Arabia,” *Qatar Med. J.*, vol. 2014, no. 1, p. 6, Jun. 2014, doi: 10.5339/qmj.2014.6.

[10] M. Mejin *et al.*, “Prevalence of pain and treatment outcomes among cancer patients in a malaysian palliative care unit,” *Pharm. Pract. (Granada).*, vol. 17, no. 1, 2019, doi: 10.18549/PharmPract.2019.1.1397.

[11] B. M. Scarborough and C. B. Smith, “Optimal pain management for patients

with cancer in the modern era," *CA. Cancer J. Clin.*, vol. 68, no. 3, pp. 182–196, May 2018, doi: 10.3322/caac.21453.

[12] C. Rayment *et al.*, "Neuropathic cancer pain: Prevalence, severity, analgesics and impact from the European Palliative Care Research Collaborative-Computerised Symptom Assessment study," *Palliat. Med.*, vol. 27, no. 8, pp. 714–721, Sep. 2013, doi: 10.1177/0269216312464408.

[13] Z. Yin *et al.*, "Development of Palliative Care in China: A Tale of Three Cities," *Oncologist*, vol. 22, no. 11, pp. 1362–1367, Nov. 2017, doi: 10.1634/theoncologist.2017-0128.

[14] "Benefits of Early Palliative Care - National Cancer Institute," *2016*. https://www.cancer.gov/news-events/cancer-currents-blog/2016/palliative-care-quality (accessed Nov. 14, 2021).

[15] S. M. Mierendorf and V. Gidvani, "Palliative care in the emergency department," *Perm. J.*, vol. 18, no. 2, pp. 77–85, Mar. 2014, doi: 10.7812/TPP/13-103.

[16] P. J. Wiffen, B. Wee, S. Derry, R. F. Bell, and R. A. Moore, "Opioids for cancer pain - an overview of Cochrane reviews," *Cochrane Database of Systematic Reviews*, vol. 2017, no. 7. Cochrane Database Syst Rev, Jul. 06, 2017, doi: 10.1002/14651858.CD012592.pub2.

[17] K. Fahad *et al.*, "King fahad medical city," Accessed: Nov. 14, 2021. [Online]. Available: https://www.kfmc.med.sa/.

[18] J. H. Kwon *et al.*, "Validation of the Edmonton symptom assessment system in Korean patients with cancer," *J. Pain Symptom Manage.*, vol. 46, no. 6, pp. 947–956, 2013, doi: 10.1016/j.jpainsymman.2013.01.012.

[19] Ö. U. Yeşilbalkan, N. Özkütük, A. Karadakovan, T. Turgut, and B. Kazgan, "Validity and reliability of the Edmonton Symptom Assessment Scale in Turkish cancer patients," *Turkish J. Cancer*, vol. 38, no. 2, pp. 62–67, 2008.

[20] C. E. Paiva, L. L. Manfredini, B. S. R. Paiva, D. Hui, and E. Bruera, "The Brazilian version of the Edmonton Symptom Assessment System (ESAS) is a feasible, valid and reliable instrument for the measurement of symptoms in advanced cancer patients," *PLoS One*, vol. 10, no. 7, Jul. 2015, doi: 10.1371/journal.pone.0132073.

[21] A. Carvajal, C. Centeno, R. Watson, and E. Bruera, "A comprehensive study of psychometric properties of the Edmonton Symptom Assessment System (ESAS) in Spanish advanced cancer patients," *Eur. J. Cancer*, vol. 47, no. 12, pp. 1863–1872, Aug. 2011, doi: 10.1016/j.ejca.2011.03.027.

[22] L. Barbera *et al.*, "The impact of routine Edmonton Symptom Assessment System (ESAS) use on overall survival in cancer patients: Results of a population-based retrospective matched cohort analysis," *Cancer Med.*, vol. 9, no. 19, pp. 7107–7115, 2020, doi: 10.1002/cam4.3374.

[23] V. Ganesh *et al.*, "An update in symptom clusters using the Edmonton Symptom Assessment System in a palliative radiotherapy clinic," *Support. Care Cancer*, vol. 25, no. 11, pp. 3321–3327, Nov. 2017, doi: 10.1007/s00520-017-3749-x.

[24] P. D. Welsby, "Who analgesic ladder," *Journal of the Royal College of Physicians of Edinburgh*, vol. 38, no. 3. StatPearls Publishing, p. 284, May 17, 2008, doi: 10.1007/978-3-642-28753-4_102537.

[25]. S.W. Fox, D.Lyon Symptom clusters and quality of life in survivors of ovarian cancer. Cancer Nurs 2007;30:354e361.

[26]. AS. Strömgren, M .Groenvold, L .Pedersen, AK. Olsen, M. Spile, P. Sjøgren. Does the medical record cover the symptoms experienced by cancer patients receiving palliative care? A comparison of the record and patient self-rating ,Journal of pain and symptom management 21 (3), 189-196.

[27]. Kingdom of Saudi Arabia Saudi Health Council National Health Information Center Saudi Cancer Registry .Cancer Incidence Report Saudi Arabia, 2015.page 80-2.

[28]. WHO. Cancer, Fact sheets 2018. 2018. Available from: https://www.who.int/news-room/fact-sheets/detail/cancer.

[29]. J. Ferlay, M. Ervik, F. Lam, M. Colombet, L. Mery… - Lyon, France: international …, 2018. France: International Agency for Research on Cancer; 2016. Available from: http://gco.iarc.fr/today.

[30]. WHO, International Agency for Research in Cancer (IARC) Saudi Arabia. Source: Globocan 2018. Available from: https://gco.iarc.fr/today/data/factsheets.

[31]. JO. Jordan, S .Elliott, E .Wall, R .Saul, Sheth… - Patient Education and & Coffman, J. (2016). Associations with resuscitation choice: do not resuscitate, full code or undecided. Patient Education and Counseling, 99(5), 823-829.

[32]. F .Anderson, Downing J. GM, Hill, L .Casorso, N . Lerch. Palliative Performance Scale (PPS): A New Tool. J PalliatCare 1996; 12(1): 5-11.

[33].T .Morita, J .Tsunoda, S. Inoue, S .Chihara. Validity of the Palliative Performance Scale from a Survival Perspective. JPain and Symptom Manage 1999; 18:2-3.

[34].PA.lume. Medicinal treatment of intractable dyspnea in terminally ill patients. J S C Med Assoc 2002;98:196-9.

[35].PN.Watson,RJ.Evans.Intractable pain with lung cancer. Pain 1987;29:163-73.

[36].J.Walker, C. H.Hansen, P.Martin, S.Symeonides,R. Ramessur,G. Murray, et al. (2014). Prevalence, associations, and adequacy of treatment of major depression in patients with cancer: a cross-sectional analysis of routinely collected clinical data. *Lancet Psychiatry* 1 343–350.

[37]. E.Ahmed (2019). Antidepressants in patients with advanced cancer: when they're warranted and how to choose therapy. *Oncology* 33 62–68.

[38]. M. J. Massie (2004). Prevalence of depression in patients with cancer. *J. Natl. Cancer Inst. Monogr.* 57–71.

[39]. A.Mitchell, M.Chan, H.Bhatti, M.Halton, L.Grassi, C.Johansen, et al. (2011). Prevalence of depression, anxiety, and adjustment disorder in oncological, haematological, and palliative-care settings: a meta-analysis of 94 interviewbased studies. *Lancet Oncol.* 12 160–174.

[40]. A. M.Krebber, L. M.Buffart, G.Kleijn, I. C.Riepma, R. de Bree., C. R. Leemans, et al. (2014). Prevalence of depression in cancer patients: a meta-analysis of diagnostic interviews and self-report instruments. *Psychooncology* 23 121–130.

[41]. Rao K., Faso A. (2012). Chemotherapy-induced nausea and vomiting: optimizing prevention and management. *Am. Health Drug Benefits* 5 232–240.

[42]. JM.Paula, HM. Sonobe, AC. Nicolussi, MMF. Zago, NO. Sawada. Symptoms of depression in patients with cancer of the head and neck undergoing radiotherapy treatment: a prospective study. Rev Latino-Am Enfermagem. 2012;20(2):1-7.

[43]. MJ .Fisch, JW. Lee, Weiss M, Wagner LI, Chang VT, Cella D, et al. Prospective, observational study of pain and analgesic prescribing in medical oncology outpatients with breast, colorectal, lung, or prostate cancer. J Clin Oncol. 2012;30(16):1980-8.

[44].World Health Organization (WHO). WHO's pain relief ladder [Internet]. Geneva: WHO; 2016 [cited 2017 Sept 20]. Available from: http://www.who.int/cancer/palliative/painladder/en.

[45]. MPO.Campos, BJ.Hassan, R. Riechelmann, A. del Giglio. Cancer-related fatigue: a review. Rev Assoc Med Bras. 2011;57(2):206-14.

[46]. MS.Panobianco, PAP.Magalhães, CR. Soares, BAL. Sampaio, AM . TO. Almeida, Gozzo, et al. Prevalência de depressão e fadiga em um grupo de mulheres com câncer de mama. Rev Elet Enf. 2012;14(3):532-40.

[47]. DA .Lamino, CAA .Pimenta, PE. Braga, DDCF. Mota. Fadiga clinicamente relevante em mulheres com câncer de mama: prevalência e fatores associados. Invest Enferm. Imagen Desarr. 2015;17(1):65-76.

[48].DDCF.Mota, CAM .Pimenta, R . Caponero. Fatigue in colorectal cancer patients: prevalence and associated factors. Rev Lat Am Enfermagem. 2012;20(3):495-503.

[49].TO .Gozzo, AMB .Moysés, PR. Silva, AM .Almeida. Nausea, vomiting and quality of life in women with breast cancer receiving chemotherapy. Rev Gaúcha Enferm. 2013;34(3):110-6

[50].V .Brateibach, ELB. Domenico, EM .Berlezi, MM .Loro, CLSP. Rosanelli, JS. Gomes, et al. Sintomas de pacientes em tratamento oncológico. Rev Ciênc Saúde. 2013;6(2):102-9.

[51].Roque VMN, Forones NM. Avaliação da qualidade de vida e toxicidades em pacientes com câncer colorretal tratados com quimioterapia adjuvante baseada em fluoropirimidinas. Arq Gastroenterol. 2006;43(2):94-101.

[52]. GT .Deimling, KF .Bowman, LJ .Wagner. The effects of cancer-related pain and fatigue on functioning of older adult, long-term cancer survivors. Cancer Nurs. 2007;30(6):421–433.

[53]. R .Bernabei, G .Gambassi, K .Lapane, F. Landi, C .Gatsonis, R . Dunlop, et al. Management of pain in elderly patients with cancer. JAMA. 1998;279(23):1877–1882.

[54]. National Cancer Institute. Estimated US cancer prevalence counts: Who are our cancer survivors in the US? 2008 [cited 2012 May 15]; Available from http://www.cancercontrol.cancer.gov/ocs/prevalence/index.html.

[55].WY Cheung, LW Le, L Gagliese, C Zimmermann.Age and gender differences in symptom intensity and symptom clusters among patients with metastatic cancer.2011. Supportive Care in Cancer 19 (3), 417-423.

[56].Higginson IJ, Bausewein C, Reilly CC, et al. An integrated palliative and respiratory care service for patients with advanced disease and refractory breathlessness: A randomised controlled trial. Lancet Respir Med. 2014;2:979–987.

[57].KC .Fearon, AC .Voss, DS. Hustead; Cancer Cachexia Study Group. Definition of cancer cachexia: effect of weight loss, reduced food intake, and systemic inflammation on functional status and prognosis. Am J Clin Nutr. 2006;83(6):1345–50.

[58].A . Vainio, A . Auvinen. Prevalence of symptoms among patients with advanced cancer: an international collaborative study. Symptom Prevalence Group. J Pain Symptom Manage. 1996;12(1):3–10.

[59].Ogama N, Suzuki S, Umeshita K, Kobayashi T, Kaneko S, Kato S, et al. Appetite and adverse effects associated with radiation therapy in patients with head and neck cancer. Eur J Oncol Nurs. 2010;14(1):3–10.

[60].McKernan B, Bydder S, Ebert M, Waterhouse D, Joseph D. A simple and inexpensive method to routinely produce customized neck supports for patient immobilization during radiotherapy. J Med Imaging Radiat Oncol. 2008;52(6):611–6.

[61].FM. Fang, WL .Tsai, HC .Chiu, WR .Kuo, CY . Hsiung. Quality of life as a survival predictor for esophageal squamous cell carcinoma treated with radiotherapy. Int J Radiat Oncol Biol Phys. 2004;58(5):1394–404.

APPENDIX:

Edmonton Symptom Assessment System:
(revised version) (ESAS-R)

Please circle the number that best describes how you feel NOW:

No Pain	0	1	2	3	4	5	6	7	8	9	10	Worst Possible Pain
No Tiredness *(Tiredness = lack of energy)*	0	1	2	3	4	5	6	7	8	9	10	Worst Possible Tiredness
No Drowsiness *(Drowsiness = feeling sleepy)*	0	1	2	3	4	5	6	7	8	9	10	Worst Possible Drowsiness
No Nausea	0	1	2	3	4	5	6	7	8	9	10	Worst Possible Nausea
No Lack of Appetite	0	1	2	3	4	5	6	7	8	9	10	Worst Possible Lack of Appetite
No Shortness of Breath	0	1	2	3	4	5	6	7	8	9	10	Worst Possible Shortness of Breath
No Depression *(Depression = feeling sad)*	0	1	2	3	4	5	6	7	8	9	10	Worst Possible Depression
No Anxiety *(Anxiety = feeling nervous)*	0	1	2	3	4	5	6	7	8	9	10	Worst Possible Anxiety
Best Wellbeing *(Wellbeing = how you feel overall)*	0	1	2	3	4	5	6	7	8	9	10	Worst Possible Wellbeing
No _____ Other Problem *(for example constipation)*	0	1	2	3	4	5	6	7	8	9	10	Worst Possible _____

Patient's Name _____

Date _____ Time _____

Completed by (check one):
- ☐ Patient
- ☐ Family caregiver
- ☐ Health care professional caregiver
- ☐ Caregiver-assisted