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RESEARCH ARTICLE

PHARMACOECONOMIC STUDY ON DRUG WASTAGE

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Abstract

Cost effective analysis are commonly used to evaluate the potential costs and benefits of health care services. They are often conducted under the assumption of no drug wastage which does not reflect the real world scenario. Cancer is a major health problem responsible for 9% deaths all over the world. Anti-cancer drugs are costlier than any other category drugs due to which the compliance to treatment is questionable. Cancer drug wastage occurs when a parenteral drug within a single-use vial is not fully administered to a patient because of body-weight or body surface-area based dose calculation in cancer chemotherapy. We conducted a prospective observational study in chemotherapy OPD where patients undergo I.V chemotherapy treatment. Data was collected for a period of three months on the drugs and its wastage. Analysis was done to find out drugs causing an increment in cost due to wastage.Our analysis showed that wastage incremented cost of treatment by an average of 3% which accounts for Rs 2,39,237.12 per annum without any added benefit. The drug with maximum cost of wastage was found to be oxaliplatin.9.43% increment in cost was due to oxaliplatin alone, the reason was concluded to be limited vial size.

Introduction:-

Pharmacoeconomics has been defined as “the description and analysis of the costs of drug therapy to healthcare systems and society.” Costs are of different types direct, indirect and intangible depending on the perspective.

Pharmacoeconomic evaluations are based on incremental analysis i.e if there are two options in treatment of a condition what are the added costs and benefits of one over the other. There are various methods to calculate this, cost minimization analysis (CMA) is one in which two or more treatment options are evaluated and found to be equivalent in terms of outcome, costs associated with each is evaluated and compared. These kinds of economic analysis can help in therapeutic decision making, drug policy decisions, treatment guidelines and pricing in pharmaceutical industries. Now this is often referred as the “fourth hurdle” in the criteria for licensing after efficacy, safety and quality of manufacture [1].

Cost effectiveness analysis are often conducted under the assumption of no drug wastage, which does not reflect real-world clinical practice. The administration of I.V drugs from single-dose packages may cause wastage because of BSA or weight based dosing. Because of variable body sizes, the amount of drug that is required may not match

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the amount of the drug in the vial, and this results in left-over drug, which is discarded. Limited vial size options and drug stability restrict the potential of vial sharing between patients [2,3].

Our objective of this study was to determine the financial loss associated with wastage of I.V chemotherapy drugs due to body weight or body surface area based dosing. We have also attempted to find out potential cost savings if more suitable vial sizes are made available.

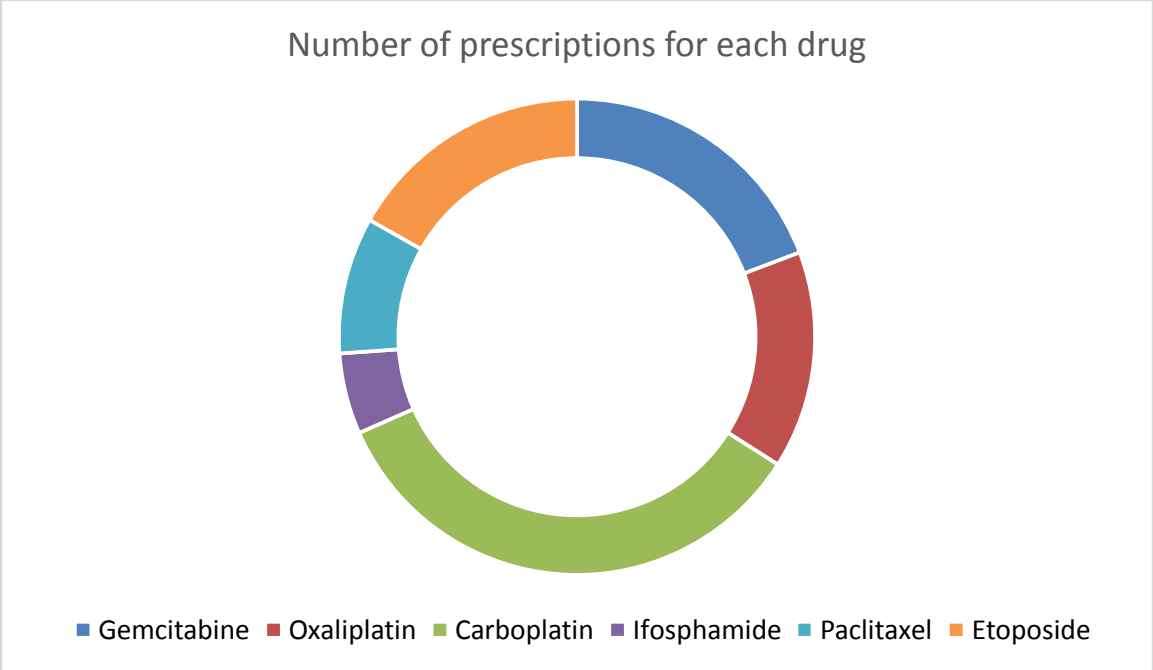
Methods:-

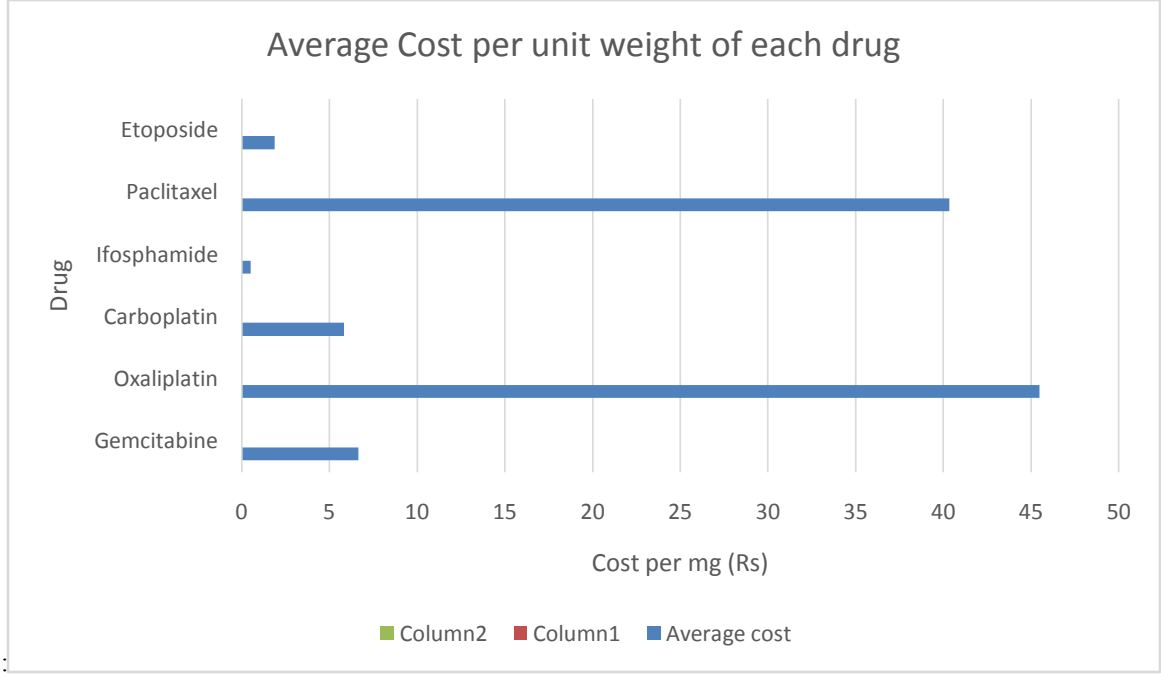
The study was conducted in a tertiary care hospital in Manipur, India. A prospective observational study was conducted in the department of radiotherapy for a period of three months, from October to December 2019. Research Ethics Board review exemptionwas cleared before the onset of the study.

Our team visited the chemotherapy OPD regularly for a period of three months to collect data on wastage of drugs associated with use of single-use I.V chemotherapy drug vials. We did a detailed study on prescriptions of these patients. Information on cost of these drug vials were obtained from hospital pharmacy. All these data was compiled to find out the % increment in annual cost of chemotherapy due to wastage.

Results:-

We came across 291 prescriptions in a period of three months observational study.





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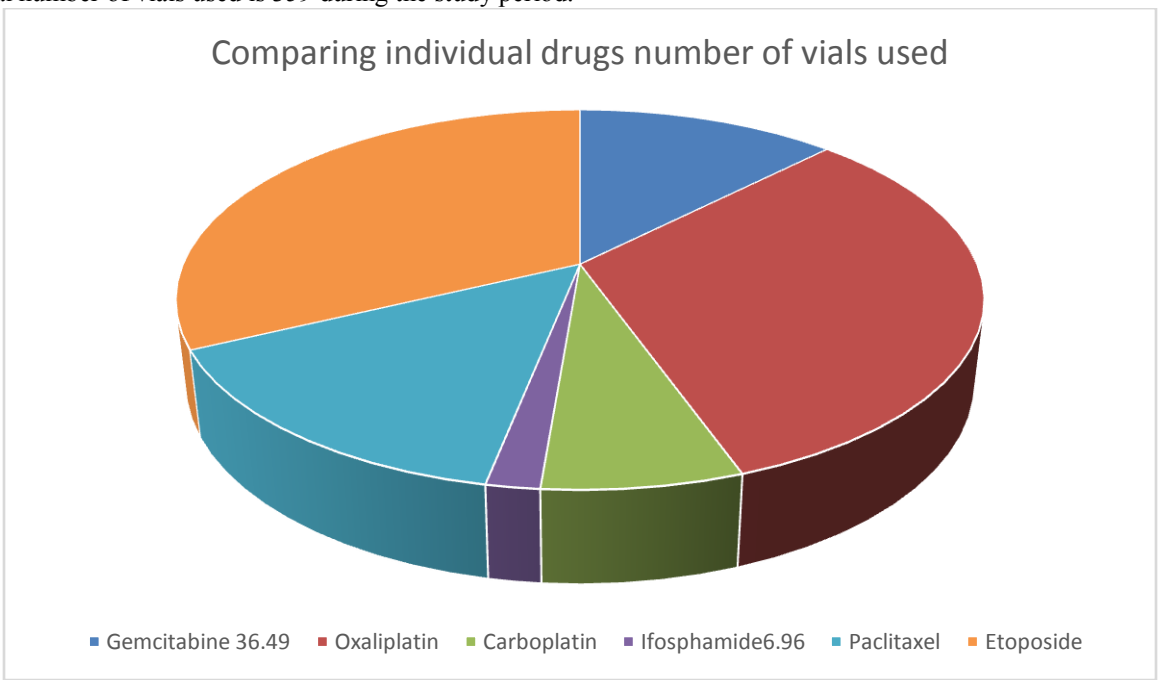
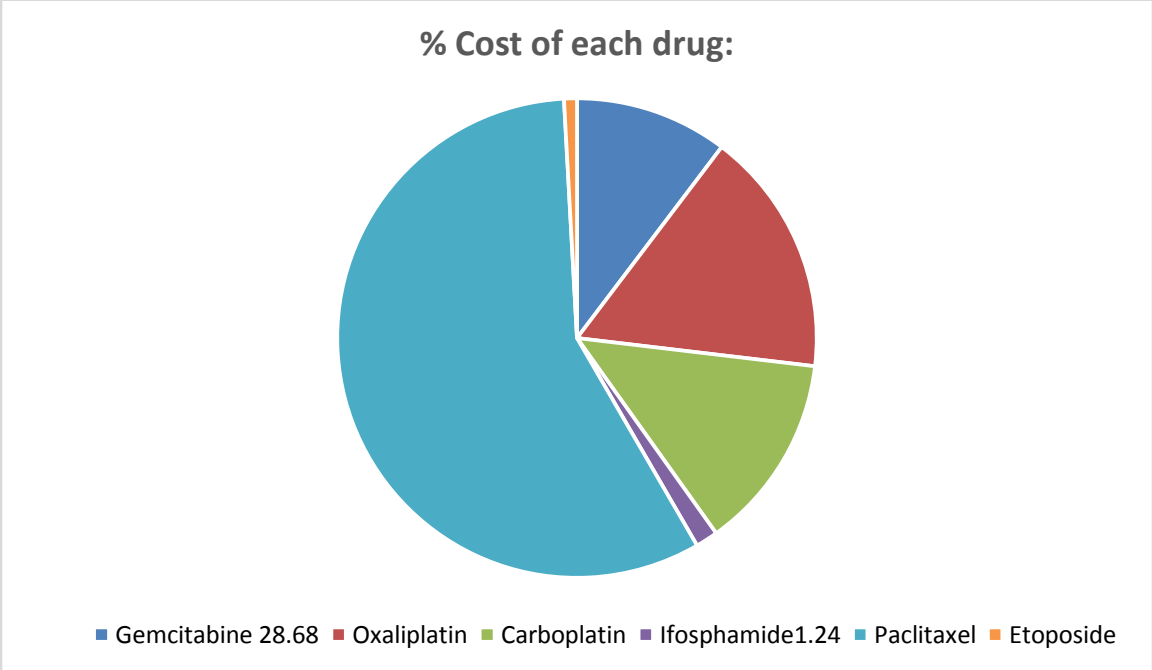
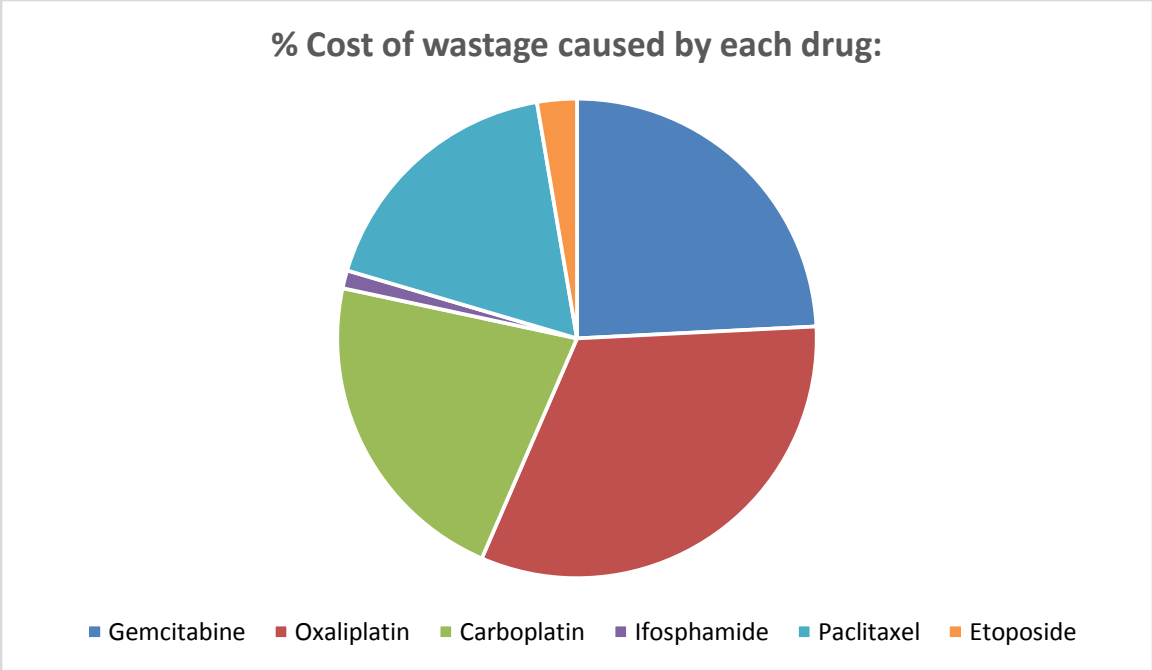
Total number of vials used is 359 during the study period.



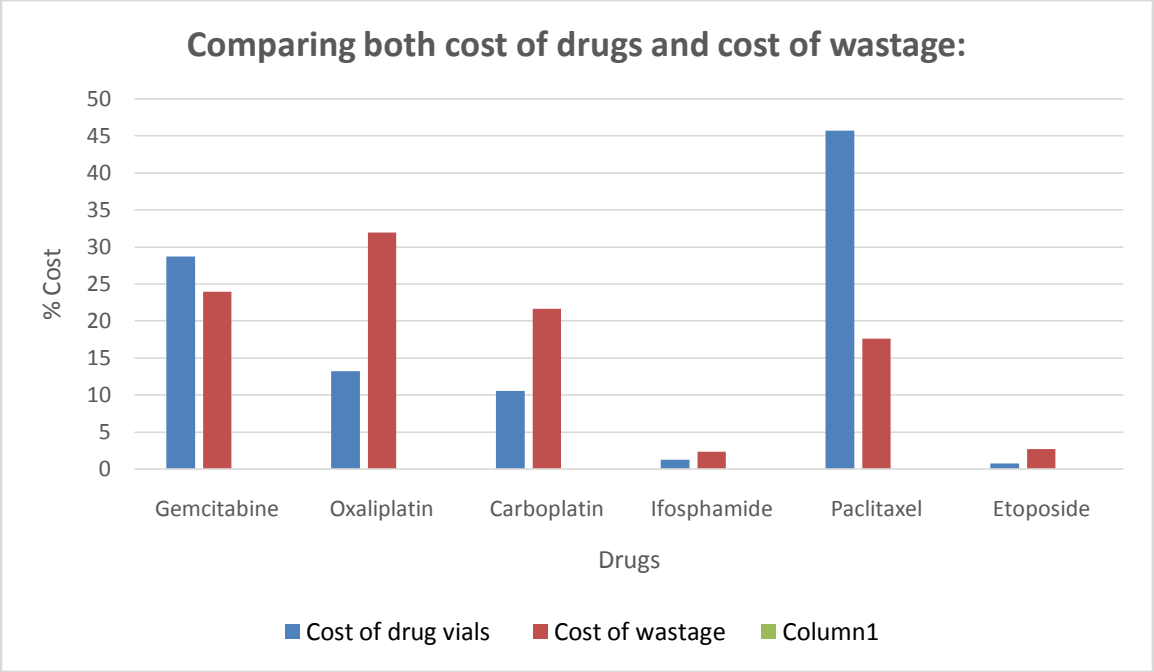
Total cost of drug vials used extrapolated for a year is 83,14,280.2



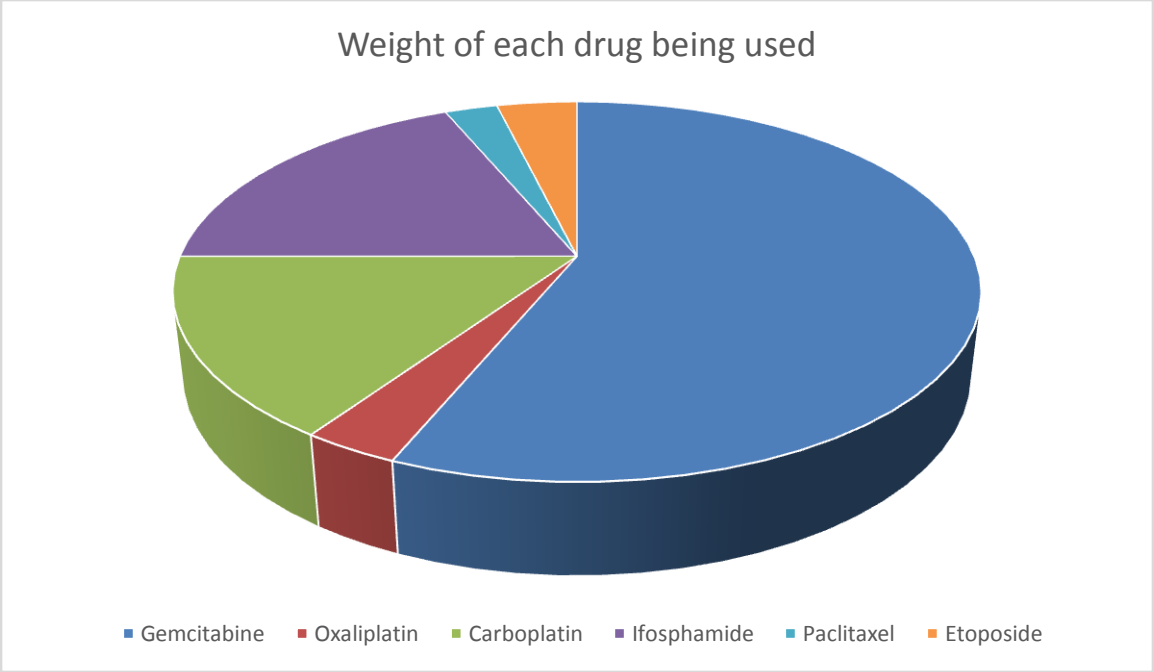
Total cost of wastage in a year is 239237.12



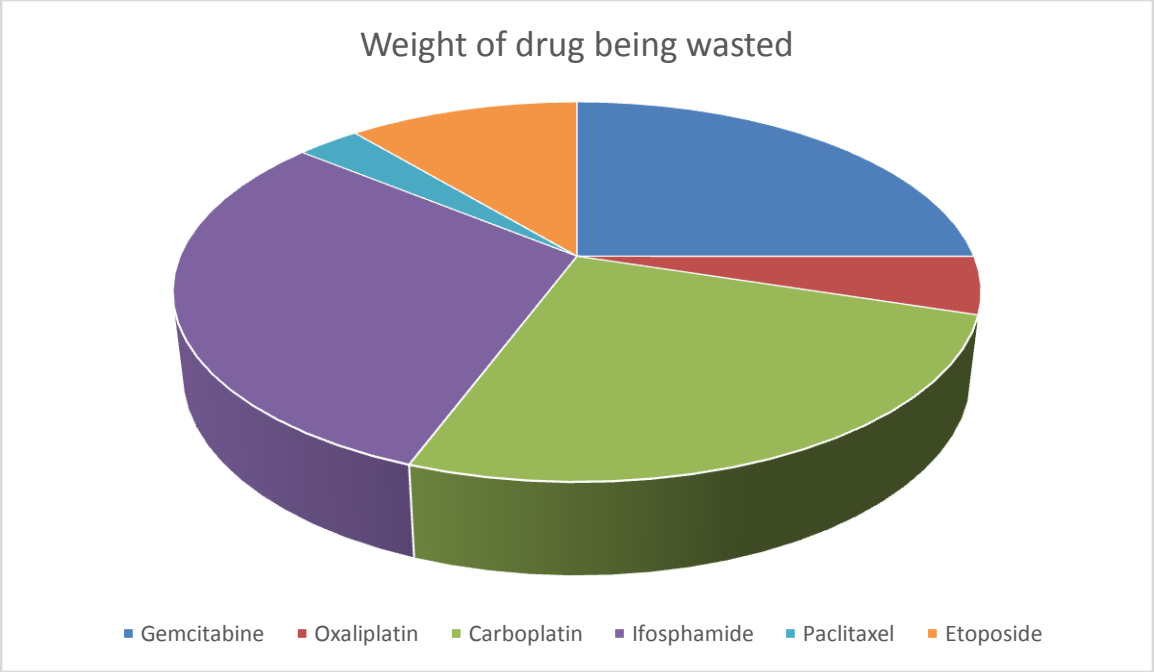
1. This indicates that 2.9% increment in cost is due to wastage alone.
2. When we calculate increment in cost due to wastage for each drug maximum is for oxaliplatin.



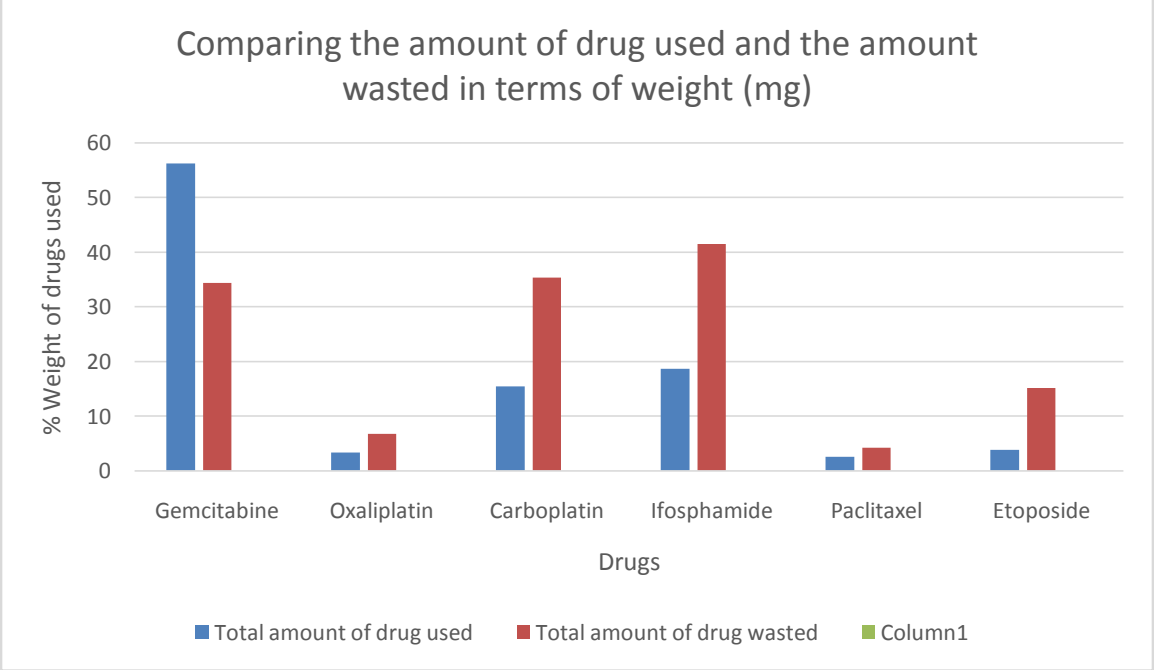
1. Total cost of each drug used is highest for Paclitaxel and lowest for Etoposide
2. Total cost of wastage is maximum for Oxaliplatin and minimum for Etoposide



1. Drug with maximum use in terms of weight is Gemcitabine and minimum for Oxaliplatin and Paclitaxel



1. While comparing the amount of drug being wasted maximum is for Ifosphamideand minimum for Paclitaxel
2. There is a 3.6% increment in amount of drug purchased due to wastage.



1. Almost every drug is causing a significant amount of wastage when compared to the amount used except gemcitabine.
2. Drug with maximum usage in terms of weight is gemcitabine while its wastage is less compared to Ifosphamide and Carboplatin.

Discussion:-

The impact of drug wastage is an increasing concern in oncology centres. Various factors such as pricing, vial size availability and drug shortages fuel the demand for the reduction of wastage. Thus rising costs of cancer care is posing a substantial financial burden to healthcare system also.[4]

A single centre found that wastage was responsible for 8.3% of total I.V drug costs, but this could be reduced by half by the implementation of protocols that include rounding up doses within 5% of the calculated dose and the selection of optimal vial sizes with chemical stability for up to 24 hours. [5]

When we study on drugs whose dosing is based on BSA or body weight it is important to consider the mean body mass or mean BSA of that particular population under study. Truong J et al showed that changing the mean body surface area or body weight caused 45% of the drugs to have a change in the vial size and/or quantity, and this resulted in increased drug costs. [6]

A study done on cost savings following vial sharing, it was found that 16% of drug cost was caused by drug wastage. [7]Guidelines regarding the use of single-use vial drugs; states that medication labelled as single use are to be used by one patient only. Single-dose vials are labelled as such by the manufacturer because they lack preservatives. There can be contamination of vials caused by breaches in sterile environment, such as sterile technique or number of punctures in the vial. Any savings associated with vial sharing may be neglected by the cost of infectious complications.

A recent study by Bach et al shown that oversized vials of chemotherapy drugs can result in substantial wastage and cost. [8] He determined that bendamustine was able to be reconstituted to produce typical patient dosages with minimal wastage because the drug was available in numerous vial sizes. In contrast, bortezomib is only available in one vial size. The leftover bortezomib equates to 27% to 30% of sales. [9]

In clinical practice, strategies have been developed to reduce wastage, including batching patients to facilitate vial sharing, reusing single use vials and dose banding [10]however these strategies may not be feasible for implementation at smaller centres and for rare diseases.Dose banding entails predefining a set of body surface area ranges and selecting a value per band to calculate the required dose.This can be carried out in large centres with good number of patients and staffs.

A 2-year retrospective study at a single institution has shown that vial sharing for cytotoxic drugs is cost-effective, especially with a 7-day vial sharing practice. However, the financial benefits are limited to specific drugs because some high-cost, low volume drugs are associated with additional costs with this vial-sharing method. [11]

Multi-dose vials may alleviate wastage, but there are concerns regarding their safety. There have been several reports of outbreaks associated with multi-dose vials that resulted in death. [12]

So from all the above mitigation strategies, we found that most practical way of reducing wastage will be by making more variety of vial sizes by looking into the average dosage prescribed. Every patient with cancer or another life-threatening disease wishes the most effective treatment, but drug prices have become staggering. So we must find ways to reduce the costs of cancer care so that there is less burden for the patients who are seeking treatment for a terminal disease.

The sale of anticancer drugs is now second only to the sale of drugs for heart disease. [13] Increasing drug cost have prompted the need for a critical evaluation regarding their value. [15]Wastage can have significant impact on economic evaluation of I.V chemotherapy drugs. Drug wastage incurs cost without providing value to patients. Drug wastage is driven by large vial sizes and restricted package options. Policymakers should encourage pharmaceutical companies to increase vial size options or refund the amount of drug wasted.

Conclusion:-

Our single-centre based study on cancer chemotherapy associated drug wastage associated with usage of single-use vials for I.V chemotherapy showed an increment of 3% in drug cost due to wastage which is quite less when compared to other studies discussed earlier. This wastage is due to its dosage calculation based on BSA or body

weight and availability of limited vials for these drugs. Our data collected for a period of three months might not show an actual picture.

Our analysis showed that wastage incremented cost of treatment by an average of 3% which accounts for Rs 2,39,237.12 per annum without any added benefit. The drug with maximum cost of wastage was found to be oxaliplatin. It is also the drug with highest average cost per unit weight. But the amount (weight) of drug prescribed is not the highest which means major portion of the drug is getting wasted due to limitation in vial size. There is a total 9.43% increment in cost due to oxaliplatin alone. Available vial sizes are only two 100 and 50mg, if 10mg vial is made available it can reduce the amount of drug wasted significantly.

Cost of drug wastage of these drugs could have been reduced by making available more variety of vial sizes that suits the doses prescribed or the manufacturer refund the cost of leftover drugs.

References:-

1. Maiti R. Postgraduate topics in Pharmacology: Pharmacoeconomics. 3rd ed. Hyderabad, India: Paras; 2020.
2. Lien K, Cheung MC, Chan KKW. Adjusting for drug wastage in economic evaluations of new therapies for hematologic malignancies: a systematic review. J OncolPract. 2016;12:369-79.
3. Centers for Disease Control and Prevention: Frequently asked questions (FAQs) regarding safe practice or medical injections: Questions about singledose/single-use vials. http://www.cdc.gov/injectionsafety/providers/provider_faqs_ singlevials.html.Accessed 20 February 2020.
4. Howard DH, Bach PB, Berndt ER, et al. Pricing in the market for anticancer drugs. J Econ Perspect. 2015;29:139-62.
5. Fasola G, Aprile G, Marini L, et al. Drug waste minimization as an effective strategy of cost containment in oncology. BMS Health Serv Res. 2014;14:57.
6. Truoung J, Cheung MC, Mai H, et al. The impact of cancer drug wastage on economic evaluations. Cancer 2017;123:3583-90.
7. Leung Y W, Cheung MC, Charbonneau LF, Prica A, Pamela Ng, Chan KW. Financial impact of cancer wastage and potential cost savings from mitigation strategies. J OncoPrac. 2017;13:7.
8. Bach PB, Conti RM, Muller RJ, etal.Overspending driven by oversized single dose vials of cancer drugs. BMJ. 2016;352:788.
9. Walker SE, Charbonneau LF, Law S, et al. Stability of azacitidine in sterile water for injection. Can J Hosp Pharm. 2012;65:352-9.
10. Chatelut E, White-Koning ML, Mathijssen RH, et al. Dose banding as an alternative to body surface area based dosing of chemotherapeutic agents. Br J Cancer. 2012;107:1100-06.
11. Smith RS. A 2-year retrospective review of vial sharing options for the compounding of cytotoxics.Eur J Hosp Pharm. 2015;22:161-4.
12. Grohskopf LA, Roth VR, Feikin DR, et al. Serratialiquefaciens bloodstream infections from contamination of epoetinalfa at a haemodialysis entre. N Engl J Med. 2001;344:1491-7.
13. Smith TJ, Hillner BE: Bending the cost curve in cancer care. N Engl J Med 2011:364:2060-5.
14. Battley JE, Connell LC, Graham DM, et al. Cost effectiveness and cancer drugs. J ClinOncol. 2014;32:1091-2.