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A prospective study on effectiveness of using pill count boxes/organisers to improve medication adherence

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ABSTRACT:
Background: The number of cancer patients is increasing rapidly, with cancer patients typically requiring a higher number of prescribed drugs compared to patients with other diseases. Research indicates that medication adherence among cancer patients with polypharmacy (taking three or more medications) is particularly low. In response, our study aimed to assess the effectiveness of introducing pill organizers/pill boxes to improve medication adherence in cancer patients.Objectives: Our study sought to evaluate medication adherence among cancer patients with polypharmacy, assess the impact of pill boxes on medication adherence, and provide patient education on their proper usage.Method: We randomly selected 60 cancer patients with polypharmacy. We conducted pre-assessments using a suitable questionnaire, employing the MORISKY medication adherence scale. Subsequently, we divided the study population into two groups of 30 each: an experimental group provided with pill boxes and a control group without. After 30 days, we conducted re-assessments using the same questionnaire and compared the results.Results: In the control group, 30% of patients initially reported not forgetting to take their medication, which increased to 40% after 30 days. The percentage of patients who occasionally forgot to take their medication also increased to 50%. Conversely, in the experimental group, the percentage of patients who did not forget to take their medication increased from 37% to 83%, while the percentage of those who occasionally forgot decreased from 37% to 17% with the use of pill boxes. Additionally, the number of patients (57%) who forgot to carry their medication while traveling decreased to only 10% after using pill boxes. Overall, the average medication adherence score in the control group increased from 4.83 to 5.23 (an 8% increase) after advising them to take their medication on time, whereas in the group using pill boxes, the score increased from 5.03 to 7.03 (a 46% increase).Conclusion: The use of pillboxes significantly improved medication adherence among the study population, thereby potentially enhancing prognosis, quality of life, and disease outcomes. Factors such as busy schedules and insufficient medication and illness counseling may have influenced patient adherence. Further research is warranted to explore additional strategies for enhancing medication adherence, including social awareness campaigns, electronic reminders, and regular pill counts during checkups, all of which are integral to overall patient care and well-being.

KEYWORDS: Medication adherence, Pill count boxes, Cancer patients, Polypharmacy, Quality of life.

I. INTRODUCTION:

Medication adherence is defined as the extent to which a patient takes medication as prescribed[1]. 1/3rd of all cancer patients having more than 3 drugs prescribed do not take their medication as directed on time, resulting as increase in hospital cost per year[2]. Recent efforts to improve medication adherence in patients with multiple co-morbidities have turned to case management and disease management programs. The present study explores the use of such pillbox or pill organisers[3].A pill box is a container used to organise medication doses for a certain length of time. It's very useful when patient have to take a few different medications; it will help in avoiding a missing dose[4].Pill organisers have different compartments for each day of the week. These are basically square shape small boxes which can contain one or more drug. They can have up to 4 spaces per day. Some organisers have sections corresponding to times of the day[5]. Hence if we use such organisers it will help to reduce the medication non-adherence and helps in effective management of drugs.

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II. MATERIALS AND METHODS:

The study employed a prospective interventional design to evaluate medication adherence among cancer patients at Bangalore Baptist Hospital, Hebbal, over a period of 3 months. A total of 60 daycare cancer patients, prescribed three or more medications and willing to participate, were included, while those with fewer than three medications or not attending daycare were excluded. Study procedure:A randomized controlled trial was conducted in the oncology department of Bangalore Baptist Hospital.Pre assessment of medication adherence was done with suitable questionnaires.A MORISKY medication adherence scale – 8 was used to collect the data. The MORISKY medication scale included 7 YES/NO questions and one item with five options as 'Never/rare', 'Once in a while', 'Sometimes', 'Usually' & 'All the time'.Total score was calculated for every individual. The possible score could range from 0 to 6, 6 to 8 & equal 8 are considered as poor, moderate & very high medication adherence respectively. After the pre assessment the total study population were divided into two, 30 each. One group was given pill boxes the other groups weren't. They were monitored for a period of 30 days. After 30 days, assessment was done with the same questionnaire & total score was computed. An average score of experimental group (Group A) & control group (Group B) was calculated respectively & comparison was made. With the help of the comparison made between the average scores of experimental group & control groups we were able to denote if there is an improvement in medication adherence after using pill count boxes or not.This assessment also helped us to see the reasons for non-adherence, effect of pill count box on improvement of quality of life and improvement of disease condition.

The data obtained were entered in a Microsoft excel sheet, and statistical analysis was performed using Statistics Program.The results are presented as Mean ± SD, counts or percentages. Comparison of two variables were performed using paired sample t test. For all tests, significant was achieved at $p<0.05$.

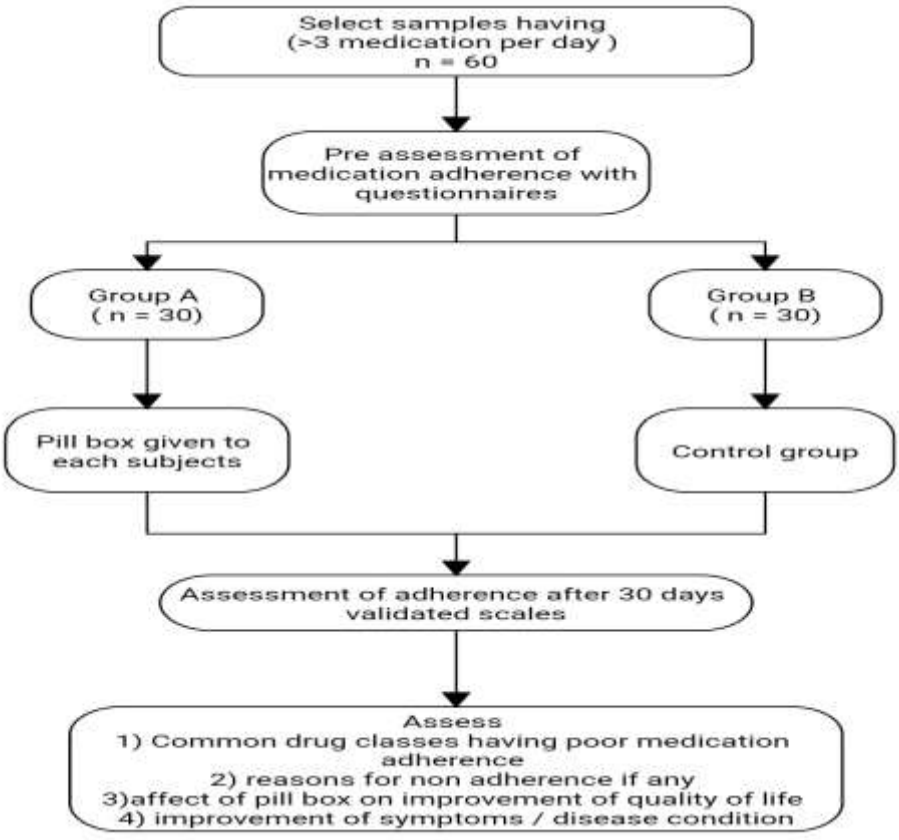

Figure 1: Schematic representation of the study methodology

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Figure 2: pill organising box

III. RESULT:

Cancer patients usually have 3 or more prescribed drugs. 1/3rd of the patients do not take their medication as directed on time regularly, resulting in the decreased outcome of the therapy & increased medical expenses. This also ends up in reduced medication adherence. In our study we have introduced pill organising boxes/ pill boxes to increase the medication adherence in cancer patients with polypharmacy. The study was aimed to check if the pill boxes can be used as one of the tool to increase medication adherence of cancer patients.

This study was done on a population of 60 random cancer patients with polypharmacy irrespective of their age & sex, where 30 patients are experimental group & 30 patients are control group.

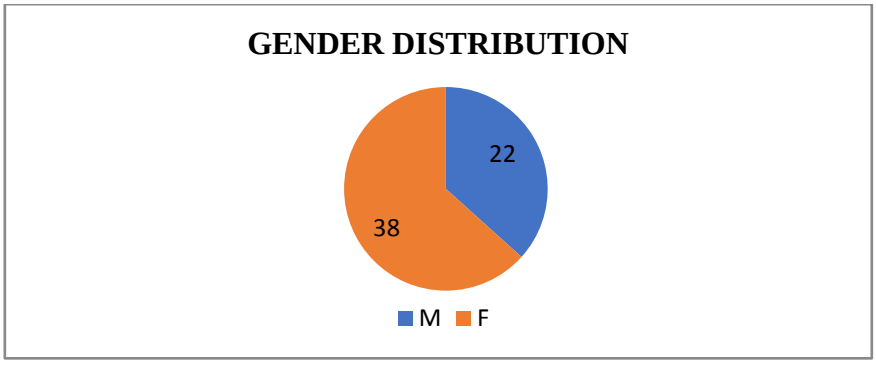

Figure 3: Gender distribution of the patients

There were 22 male patients (37%) and 38 female patients (63%), making up to the total study population (figure3).

Table 1: Age

Study population	Mean ± SD
Control Group	57.06 ± 16.39
Experimental group	56.86 ± 14.72

Table 2: Number of drugs

Study	Mean ± SD
Control Group	8.2 ± 2.25
Experimental group	8.4 ± 2.21

The mean and standard deviation (SD) of age & number of drugs of the study population are represented in Tables 2 and 3, respectively. The experimental group's mean was 56.86 and the control group's was 57.06, with standard deviations of 14.72 and 16.39 respectively. With standard deviations of 2.25 and 2.21, the mean for the number of medicines was determined to be 8.2 for the control group and 8.4 for the experimental group.

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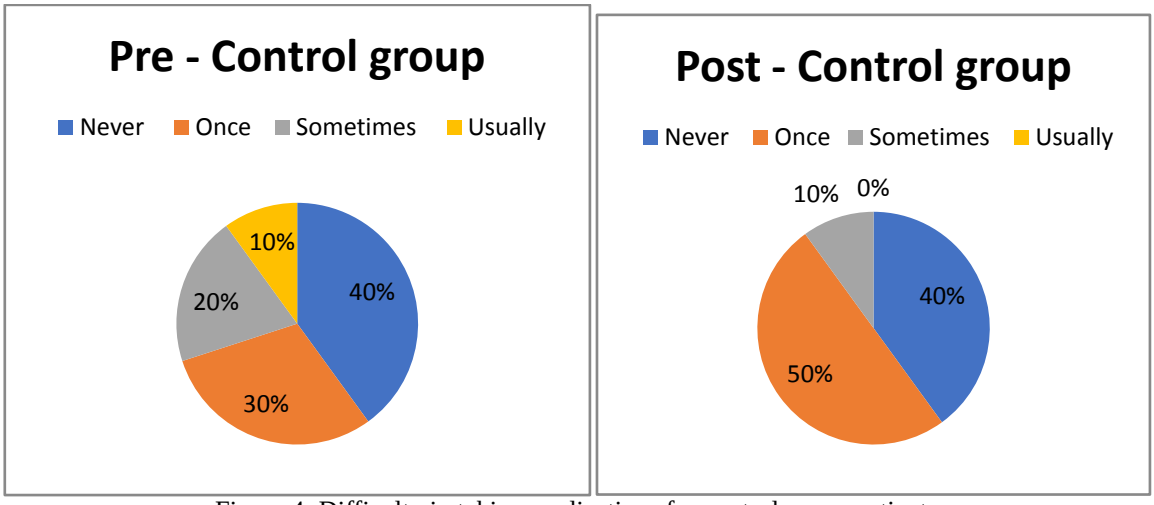

Figure 4: Difficulty in taking medications for control group patients

In case of control group 40% patients were 'never' forgetting to take their medication on time, whereas 30% would forget 'once in a while'. After advising them to take their medication regularly on time, the number of patients who were 'never' forgetting to take medicine on time increased to only 40% & patients who were forgetting 'once in a while' also increased to 50%. It was also found that 20% patients would forget to take their medicine 'sometimes' & 10% would forget 'usually'. But after the study period it became 10% & 0% respectively (Fig 4).

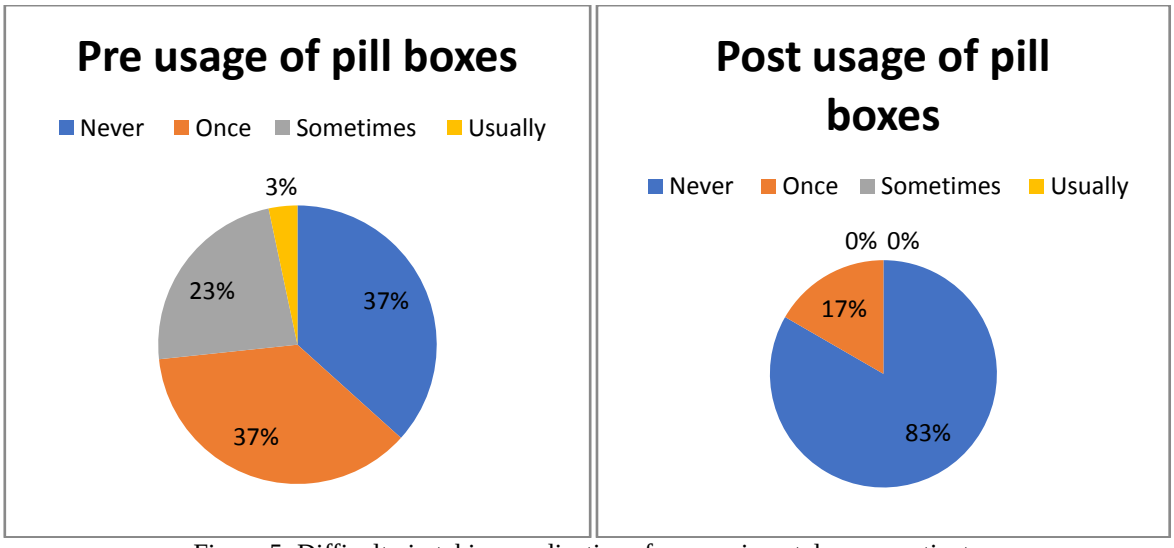

Figure 5: Difficulty in taking medications for experimental group patients

It was found that in experimental group 37% patients were 'never' forgetting to take their medication on time, whereas 37% would forget 'once in a while'. After using pill boxes, the patients who were 'never' forgetting to take medicine on time increased to 83% & who were forgetting 'once in a while' reduced to 17%. It was also found that 23% patients would forget to take their medicine 'sometimes' & 3% would forget 'usually'. But after the pill box usage both turned out to be 0% (Fig 5).

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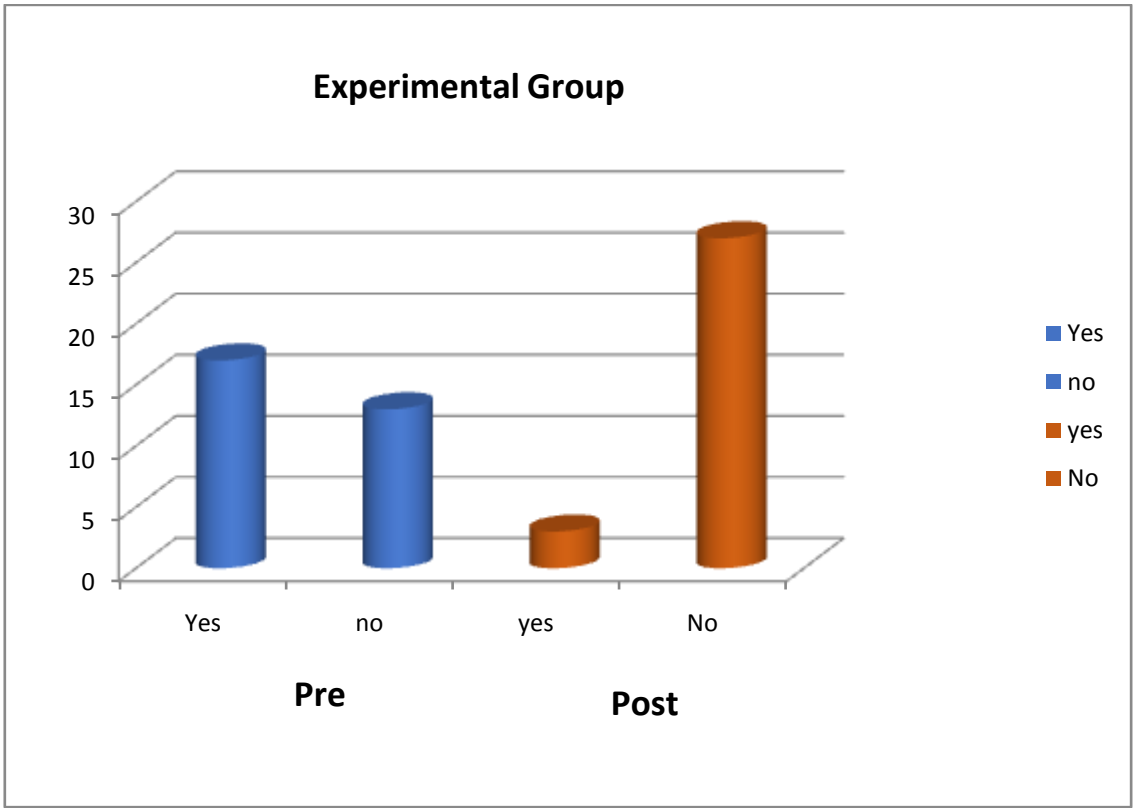

Figure 6: People forgetting to take medicine while travelling

In the study we also found out that it was difficult for patients to carry the medicines while travelling without missing. There were 17 patients (57%) who usually forget to carry the medicine while travelling & 13 patients (43%) who would always carry the medicine along with. After starting to use the pill boxes patients who forgot to take medicine while travelling reduced to 3(10%) (Figure 6).

Overall it was found out that in control group the average MMAS score was 4.83 which became 5.23 that is only 8% increase. But the patients who were using pill boxes before using it the average MMAS scores were 5.03 & after using the pill boxes the average score became 7.03 which is 46% increase.

Table 3: t test for control group

Conditions	Mean ± SD	P value = **0.2276**
Pre assessment	4.83 ± 1.24	
Post assessment	5.23 ± 1.30	

Table 4: t test for experimental group

Conditions	Mean ± SD	P value < **0.0001**
Pre assessment	5.03 ± 1.13	
Post assessment	7.30 ± 0.822	

Table 3 & 4 shows a t-test was conducted to compare the medication adherence scores between the control and experimental groups. The results revealed that the p-value for the control group was not significant ($p > 0.05$), suggesting no significant difference in medication adherence between the pre and post-intervention periods for this group. However, in contrast, the p-value for the experimental group was highly significant ($p < 0.05$), indicating a substantial improvement in medication adherence among patients using pill boxes.

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IV. DISCUSSION:

This study has been the first in India. The findings of this study underscore the critical importance of medication adherence in cancer care, particularly among patients grappling with polypharmacy[6]. Our investigation focused on evaluating the effectiveness of utilizing pill count boxes/organizers to bolster medication adherence among cancer patients receiving multiple medications.

Impact of Pill Count Boxes on Medication Adherence:Our study demonstrated a significant improvement in medication adherence among patients utilizing pill count boxes (95% confidence interval,5.03 ± 1.13 vs 7.30 ± 0.822, P-value <0.0001) compared to those who did not (95% confidence interval, 4.83 ± 1.24 vs 5.23 ± 1.30, P-value = 0.2276). The use of pill organizers led to a substantial increase in patients remembering to take their medications on time, as evidenced by the marked decrease in the percentage of patients forgetting their medications, both occasionally and regularly. This improvement was particularly pronounced in terms of adherence during travel, with a notable reduction in forgetfulness among patients using pill boxes.Implications for Quality of Life by enhancing medication adherence it is not merely about ensuring compliance with prescribed regimens; it also holds profound implications for the quality of life of cancer patients. By adhering more closely to their medication schedules, patients may experience better disease management, reduced symptom burden, and potentially improved treatment outcomes.[6]

Contributions made towards increasing the state of knowledge in the subject: The project's goal is to raise public awareness of the need for regular medication compliance to enhance therapeutic outcomes. The study had a significant impact on taking prescribed drugs at the appropriate times. The individuals' increased adherence and development of a positive outlook have been facilitated by their increased understanding of the condition and the significance of each drug.

Challenges and Future directions: patient education, counseling, and ongoing support are crucial in maximizing the benefits of pill organizers. Moreover, addressing barriers such as a hectic schedule or inadequate understandingrequires a multifaceted approach involving healthcare providers, patients, and caregivers.Moving forward, further research is warranted to delve deeper into strategies exploring complementary interventions such as electronic reminders, social awareness campaigns, or enhanced patient education programs. Additionally, longitudinal studies are needed to assess the long-term impact of pill count boxes on medication adherence, treatment outcomes, and overall quality of life.

V. CONCLUSION:

Pillbox use has undoubtedly affected the study population's medication adherence, which has a substantial impact on the prognosis, quality of life, and outcome of the disease. Nonetheless, a number of variables, including a hectic schedule, inadequate medication and illness counseling, and the capacity to explain the value of supporting drugs in cancer treatment, may have had an effect on the patient's adherence. Further research is needed to analyze how to enhance medication adherence. Social awareness campaigns, electronic reminders, and stringent pill counts during frequent checkups can all be important components of patient care connected to overall health and quality of life.

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ETHICS: Consent was taken from the patients before starting the Study.
COMPETING INTEREST: Author declared no other competing interest.

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