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# A PROSPECTIVE STUDY ON THE ASSESSMENT OF PRESCRIBING PATTERN AND IMPACT OF PATIENT COUNSELLING, MEDICATION ADHERENCE AND QUALITY OF LIFE AMONG PATIENTS WITH PARKINSONISM

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## ABSTRACT

**Background:** Parkinsonism is the second most common neurodegenerative disease. Parkinson's disease, there is a gradual loss of brain cells that make and store dopamine. **Materials and Methods:** A Prospective observational study was carried out for a period of 12 months and subjects were selected from the Neurology department of Cosmopolitan hospital. In the study the patients were assessed using the UPDRS, PDQL and MGL Scale and their case sheets were reviewed. **Results:** We analysed 104 patients. Levodopa is the mainstay as monotherapy as well as in combination with other antiparkinsonian medications. Levodopa monotherapy comprised approximately 38.46% of prescriptions in the study period, followed by Rasagiline, Amantadine and Trihexyphenidyl. Combination therapy including levodopa with either DA or other antiparkinsonian medications was 53.84% in the study period. Among the combination therapies, Levodopa + other anti- parkinsonism medications (other than DA) were the most commonly prescribed regimen. The mean of UPDRS rating score of total population has declined from 47.05+/-18.08 to 43.61+/-18.52 as compared to the initial visit at the end of study which means patient condition has improved symptomatically 7.88% by our intervention. The improvement in the medication adherence was found to be 61.33%. The improvement in quality of life was 9.19% from our intervention. **Conclusion:** Levodopa is the mainstay as monotherapy as well as in combination with other antiparkinsonian medications. Patient counselling had an important impact on medication adherence and quality of life of Parkinsonian Patients. Effective patient counselling and better drug compliance improved patient's quality of life.

**KEYWORDS:** Parkinsonism, Levodopa, Updrs, PDQL, MGL.

## INTRODUCTION

Parkinsonism is a neurodegenerative disease characterized by motor manifestations (bradykinesia, rigidity, resting tremor, and postural instability), autonomic dysfunction and neurological disorders and sensory symptoms.[1] There are currently no available treatments to slow the progression of Parkinson's disease over time, but available drugs and therapies can effectively treat symptoms often for years. Because Parkinson's disease is highly variable, what works for one patient may not work for another.[2]

The aim of this study was to investigate the Prescribing pattern of antiparkinsonian agents in a tertiary care hospital, with particular emphasis on patients with PD in stages in HY scale.[3]

In the present study we had made an attempt to study the common prescribing pattern followed in Parkinsonism and the impact of patient counselling on medication adherence and quality of life in Parkinsonism patients.

## METHODOLOGY
Prospective Observational Study. The study was carried out for a period of 1 year. The subjects were selected from the Neurology department of Cosmopolitan Hospital.

### Inclusion Criteria
Patients with already diagnosed and newly Parkinsonism

### Exclusion criteri
Patients who are not willing to participate in the study.

**Data Collection**

A written informed consent was taken from the patients diagnosed with Parkinsonism. All relevant information regarding the study was collected from case records and direct interview with the care takers. The patients or care takers were then to be educated about the disease, medication, diet, exercise. In the study the patients were assessed using the UPDRS, PDQL and MGL Scale and their case sheets were reviewed. 3 readings were collected for each scale and analysed. Suitable graphs and tables were statistically plotted. We observed antiparkinsonian prescriptions. Each prescription was classified as either monotherapy or combination therapy.

**RESULTS**

Our study was conducted in the department of Neurology for a period of 1 year in a tertiary care multispecialty hospital. During our study period, there were 104 patients who were fulfilling the study criteria. In this study we analysed prescribing pattern of antiparkinsonian drugs, medication adherence, quality of life and patient symptomatic improvement after the counselling.

**Table 1: Sample demographics ($n = 104$).**

| Sl.No. | Characteristic | Total $N$(%) or mean (SD) |
|--------|----------------|---------------------------|
| 1 | Mean age, yrs, (SD) | 70.28 (7.98) |
| 2 | Male, $n$ (%) | 56 (53.84) |
| 3 | Mean duration of PD, yrs, (SD) | 3.46 (3.47) |
| 4 | Mean Hoehn and Yahr stage, (SD) | 2.25(0.81) |
| 5 | Hoehn and Yahr stage, $n$ (%) | |
| | Stage 1: Unilateral disease | 18 (17.30) |
| | Stage 2: Bilateral disease, without impairment of balance | 48 (46.15) |
| | Stage 3: Mild-to-moderate bilateral disease; some postural instability; physically independent. | 32 (30.76) |
| | Stage 4: Severe disability; still able to walk or stand unassisted | 6 (5.76) |
| 6 | Early onset PD (%) | 4 (3.84) |
| 7 | Late Onset PD (%) | 100 (96.16) |

**Analysis of Prescribing Pattern**

We studied about prescribing pattern of antiparkinsonian drugs by analysing patient's case sheets. From that we found Levodopa was the mainstay as monotherapy or in combination with other antiparkinsonian medications.

**Table 2: Proportion of prescriptions with particular antiparkinsonian therapy category with Hoehn and Yahr stage of Parkinsonism.**

| | HY Stage 1 | HY Stage 2 | HY Stage 3 | HY Stage 4 |
|---|---|---|---|---|
| **Total number of prescriptions** | 18 | 48 | 32 | 6 |
| **Monotherapy** | **16** | **18** | **12** | **0** |
| Levodopa | 12 | 16 | 12 | 0 |
| Rasagiline | 2 | 0 | 0 | 0 |
| Amantadine | 2 | 0 | 0 | 0 |
| Trihexyphenydyl | 0 | 2 | 0 | 0 |
| **Combination therapy** | **2** | **30** | **20** | **6** |
| Levodopa[*] + dopamine agonist | 0 | 2 | 8 | 0 |
| Levodopa[*] + others[**] | 0 | 24 | 10 | 0 |
| MAO-B Inhibitors[†]+ Anticholinergics[‡] | 2 | 0 | 0 | 0 |
| Levodopa[*] + dopamine agonist + others[**] | 0 | 2 | 2 | 4 |
| Levodopa[*] + Amantadine+ Anticholinergics[‡] | 0 | 0 | 0 | 2 |
| Levodopa[*] + COMT inhibitor[††]+ Anticholinergics[‡] | 0 | 2 | 0 | 0 |

*.Levodopa alone and combination of levodopa and dopa-decarboxylase inhibitors.

**.Other includes Amantadine, Selegiline, Rasagiline, Entacapone and Trihexyphenidyl

[†].MAO-B inhibitors include Selegiline, Rasagiline

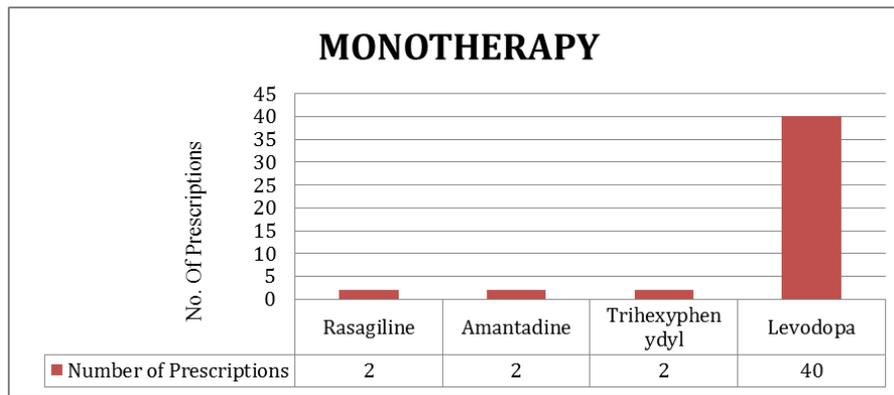[‡] .Anticholinergics includes Trihexyphenidyl

[††] .COMT inhibitors include Tolcapone
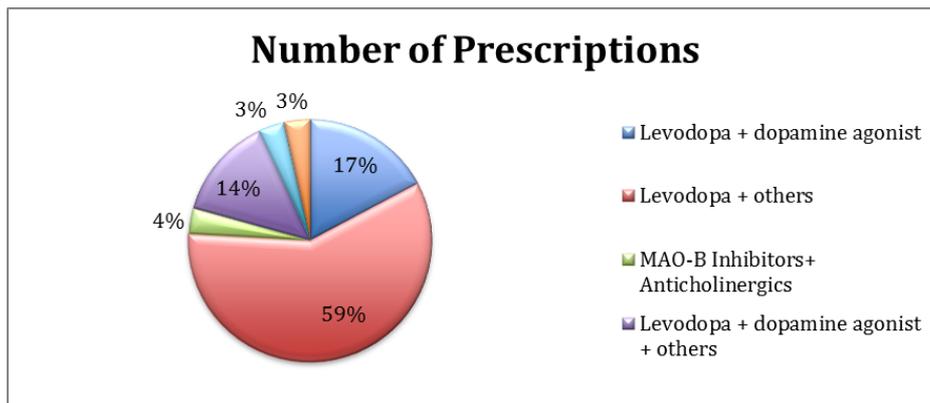
**Figure 1: Proportion of monotherapy**



**Figure 2: Proportion of combination therapy.**

**Analysis of UPDRS Score**

UPDRS score were taken from each patient during all visits and were compared. All patients showed symptomatic improvement on their conditions in subsequent visits.

From figure 3 paired t test showed that treatment significantly effective in improving UPDRS scaling between first and second: second and third review and first and third review in the total sample ($p < 0.001$). At the time of initial visit, the average UPDRS score was 47.05 +/- 18.08 and its significantly improved to 45.13+/-18.38 in second review and then to 43.61+/-18.52.

**Table 3: Efficacy of treatment in improving UPDRS in the total sample and subsample based on HY stage.**

| Sample | Review | M | SD | Compare | Change (%) | t | P |
|---|---|---|---|---|---|---|---|
| TOTAL | 1 | 47.05 | 18.08 | (1,2) | 4.25 | 9.63 | 0.000** |
| | 2 | 45.13 | 18.38 | (2,3) | 4.56 | 6.86 | 0.000** |
| | 3 | 43.61 | 18.52 | (1,3) | 7.88 | 10.97 | 0.000** |
| STAGE 1 | 1 | 22.22 | 4.02 | (1,2) | 9.89 | 3.20 | 0.012* |
| | 2 | 20.22 | 4.63 | (2,3) | 9.00 | 2.29 | 0.050* |
| | 3 | 18.55 | 2.92 | (1,3) | 19.78 | 5.18 | 0.002** |
| STAGE 2 | 1 | 41.85 | 9.35 | (1,2) | 5.62 | 6.63 | 0.000** |
| | 2 | 39.62 | 9.53 | (2,3) | 3.88 | 4.22 | 0.000* |
| | 3 | 38.14 | 9.62 | (1,3) | 9.72 | 7.38 | 0.000** |
| STAGE 3 | 1 | 61.10 | 13.84 | (1,2) | 2.82 | 6.62 | 0.000** |
| | 2 | 59.42 | 13.98 | (2,3) | 3.68 | 5.38 | 0.000** |
| | 3 | 57.31 | 14.74 | (1,3) | 6.61 | 6.58 | 0.000** |
| STAGE 4 | 1 | 69.00 | 4.35 | (1,2) | 1.47 | 1.72 | 0.225† |
| | 2 | 68.00 | 5.19 | (2,3) | 0.50 | 0.38 | 0.742† |
| | 3 | 67.66 | 6.42 | (1,3) | 1.98 | 0.918 | 0.456† |

*: significant at 5% level ($p < 0.05$)

**: significant at 1% level ($p < 0.01$)

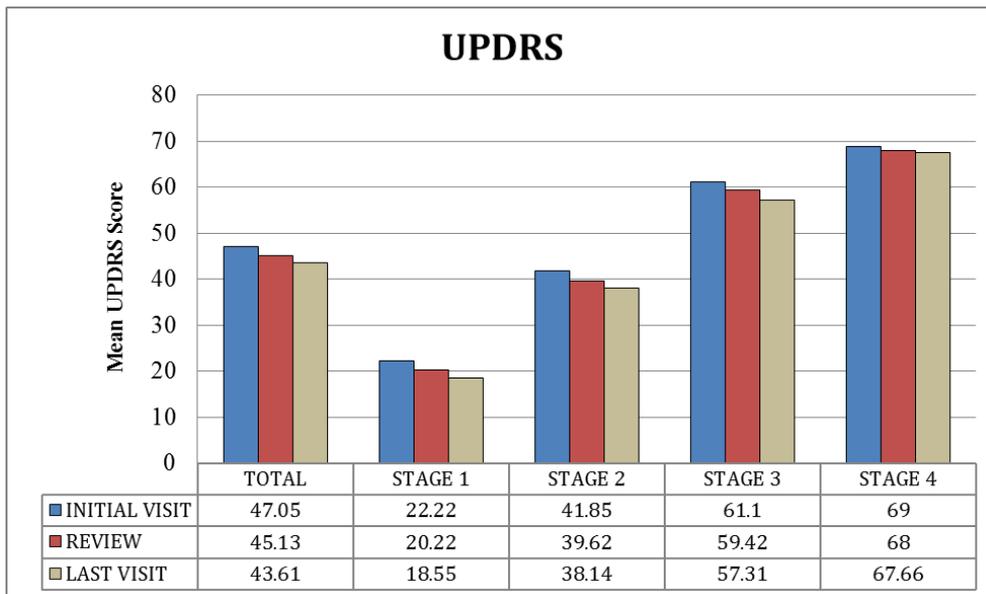†: Not significant ($p > 0.05$)

**Figure 3: Efficacy of treatment in improving UPDRS in the total sample and subsample based on HY stage.**

**Analysis of MGL Score**
We used Morisky Green Levine Scale to assess the medication adherence in Parkinsonism patients. MGL score taken from each patient during all visits and compared.

All patients showed significant improvement on their medication adherence in each visit except patients who belonged in Stage 4. From figure 4 paired t test showed that treatment significantly effective in improving MGL scaling between first and second: second and third review and first and third review in the total sample ($p<0.001$). At the time of initial visit, the average MGL score was $2.25+/-0.81$ and its significantly improved to $3.17+/-0.58$ in second review and then to $3.63+/-0.48$.

Paired t test showed that treatment significantly effective in improving MGL scaling between first and second: second and third review and first and third review in sample where in stage 1 ($p<0.001$). In the first review the average MGL is $2.33+/-0.28$ and its significantly

improved to $3.11+/-0.20$ in second review and then to$3.66+/-0.16$.

Where in stage 2 patients paired t test showed that treatment significantly effective in improving MGL scaling between first and second: second and third review and first and third review in sample ($p<0.001$).In the first review the average MGL is $2.38+/-0.74$ and its significantly improved to $3.33+/-0.48$ in second review and then to$3.52+/-0.51$.From table 1 paired t test showed that treatment significantly effective in improving MGL scaling between first and second: second and third review and first and third review in sample where in stage 3 ($p<0.001$).At the time of initial visit the average MGL score was $2.15+/-0.89$ and its significantly improved to $3.10+/-0.65$ in second review and then to$3.73+/-0.45$.In stage 4 patients, paired t test showed that treatment is not significant in improving MGL scaling between first and second: second and third review and first and third review in sample ($p>0.05$).
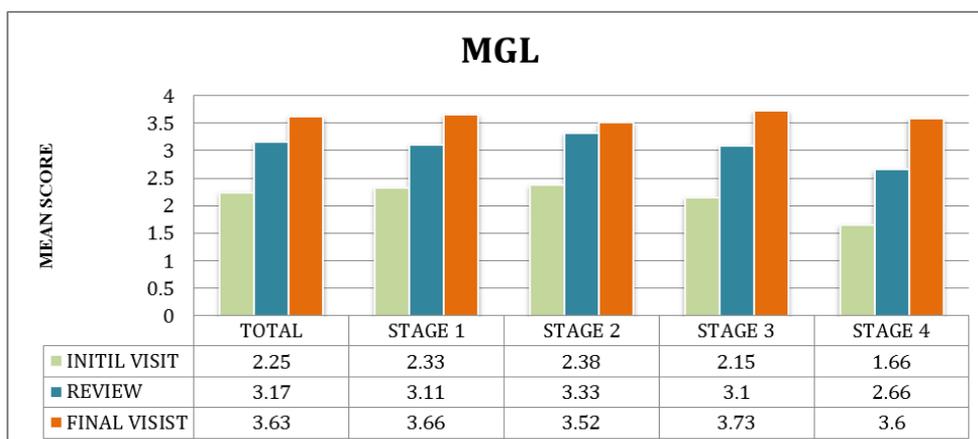


**Figure 4: Efficacy of treatment in improving MGL in the total sample and subsample based on HY stage.**

**Analysis of PDQL Score**

We used PDQL scale to assess the quality of life of patients. The score was taken from each patient during all visits and compared.

From figure 5 paired t test showed that treatment significantly effective in improving PDQL scaling between first and second: second and third review and first and third review in the total sample (p<0.001). In the first review the average PDQL is 104.38+/-17.40 and it's significantly improved to 109.17+/-18.90 in second review and then to 113.98 +/-18.90.

**Table 4: Efficacy of treatment in improving PDQL in the total sample and subsample based on HY stage.**

| Sample | Review | M | SD | Compare | Change (%) | t | P |
|--------|--------|------|------|---------|-----------|--------|----------|
| TOTAL | 1 | 104.38 | 17.40 | (1,2) | 4.807 | 15.33 | 0.000** |
|  | 2 | 109.17 | 18.10 | (2,3) | 4.412 | 12.568 | 0.000** |
|  | 3 | 113.98 | 18.90 | (1,3) | 9.197 | 16.78 | 0.000** |
| STAGE 1 | 1 | 129.33 | 9.41 | (1,2) | 5.24 | 7.214 | 0.000** |
|  | 2 | 136.11 | 8.42 | (2,3) | 4.89 | 14.142 | 0.000** |
|  | 3 | 142.77 | 8.33 | (1,3) | 10.39 | 10.582 | 0.001** |
| STAGE 2 | 1 | 104.23 | 12.16 | (1,2) | 4.06 | 11.23 | 0.000** |
|  | 2 | 108.47 | 12.33 | (2,3) | 4.30 | 6.24 | 0.000** |
|  | 3 | 113.14 | 13.00 | (1,3) | 8.54 | 10.36 | 0.000** |
| STAGE 3 | 1 | 96.84 | 13.07 | (1,2) | 5 | 11.32 | 0.000** |
|  | 2 | 101.68 | 12.96 | (2,3) | 4.45 | 9.43 | 0.000** |
|  | 3 | 106.21 | 12.28 | (1,3) | 9.67 | 12.118 | 0.000** |
| STAGE 4 | 1 | 78.33 | 0.577 | (1,2) | 2.97 | 1.6 | 0.250[†] |
|  | 2 | 80.66 | 3.05 | (2,3) | 2.47 | 3.46 | 0.074[†] |
|  | 3 | 82.66 | 2.51 | (1,3) | 5.52 | 3.606 | 0.069[†] |

*: significant at 5% level (p<0.05) **: significant at 1% level (p<0.01) [†]: Not significant (p>0.05)



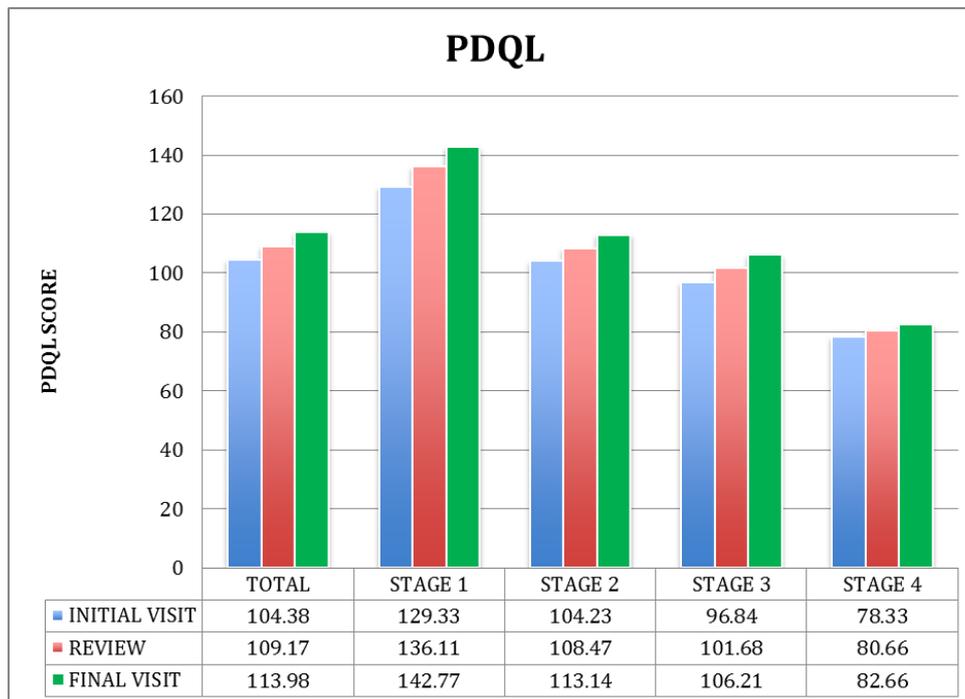| PDQL | TOTAL | STAGE 1 | STAGE 2 | STAGE 3 | STAGE 4 |
|------|-------|---------|---------|---------|---------|
| INITIAL VISIT | 104.38 | 129.33 | 104.23 | 96.84 | 78.33 |
| REVIEW | 109.17 | 136.11 | 108.47 | 101.68 | 80.66 |
| FINAL VISIT | 113.98 | 142.77 | 113.14 | 106.21 | 82.66 |

**Figure 5: Efficacy of treatment in improving PDQL in the total sample and subsample based on HY stage.**

**DISCUSSION**

Parkinson's disease is a complex condition due to the progressive nature of its motor and non-motor symptoms, in addition to the fact that PD medicines quickly lose their effectiveness and cause long-term side effects. These characteristics create the necessity of a comprehensive approach towards a constant monitoring of the pharmacological therapy and the PD effects on the patients' Quality of life.

**Analysis of Prescribing Pattern**

In this study we firstly examined trends of antiparkinsonian drugs prescribed to parkinsonism diseased patients in a tertiary care hospital, Trivandrum,

Kerala, India during a period of 2018 -2019. We found that Levodopa (combination with carbidopa) was mostly prescribed antiparkinsonian drug about 38.46% as monotherapy and 52.7 % as in combination therapy among the 104 patients. An increased duration of the treatment and severity of disease, resulted in higher daily doses of Levodopa prescribed. In 104 prescriptions 24 contains Trihexyphenydyl (Anticholinergic) and 16 of each prescription contained Rasagiline (MAO-B Inhibitor) and dopamine facilitator drug Amantidine.18 patients were treated with Dopamine agonists in that 12 were by Pramipexole and 4 were by Ropnirole and remain by Bromocriptine.

A study done by Yvette Bordelon et al[6] said that the majority of subjects (91%) were on levodopa either alone or in combination with other PD medications. Levodopa only 67 (34.9%) Levodopa and any other medication 108 (56.3%), Dopamine agonists without levodopa 17 (8.9%). Our study also showed that Levodopa (combination with carbidopa) was mostly prescribed antiparkinsonian drug about 38.46% as monotherapy and 52.7% as in combination therapy.

M̈oller and colleagues,[9] reported on drug classes used in PD treatment in Germany from a general population sample revealed that 94.2% of patients were treated with levodopa. Sixteen percent of their PD population under the age of 70 were on levodopa alone without using dopamine agonists, and thus they reported that best treatment practices are not necessarily put into effect in the general population. They did not perform neurologic examinations to ascertain level of medication response.

Our study provides a descriptive overview of the pattern of use of antiparkinsonian agents in a tertiary care hospital in Kerala. It will be pertinent to investigate if the upward trends in use of Levodopa, Amantadine, Entacapone, and Ropinirole continue in the future and how such trends might be influenced by the introduction of new medications into the market.

**Analysis of UPDRS Score**
We used Unified Parkinsonism Disease Rating Scale (UPDRS) to assess the patient disease progression symptomatically. During patient counselling we did physical examination mainly by observing and check the rigidity by rotating the hand, finger taps and also checked the hand movements. We also observed and analysed the patient's speech, drooling, resting tremor, arising from chair, walking, gait, posture, facial expression and the scoring was done.

The mean of UPDRS rating score of total population has declined from 47.05+/-18.08 to 43.61+/-18.52 as compared to the initial visit at the end of study which means patient condition has improved symptomatically 7.88% by our intervention.

By analysing the UPDRS rating score of population from stage 1 to 4 we came to observe that the percentage symptomatic change varies in each stage, which means the symptomatic percentage change decreases as we move from stage 1 to stage 4. Through patient counselling, proper drug therapy, lifestyle modification we were able to improve the patient condition a lot for stage 1 population, but in case of stage 4 population no significant improvement was observed as the disease has already severely affected the patient condition. Stage 4 patient's condition cannot be reversed significantly but we can only stabilize their condition, without being worsened.

**Analysis of MGL Score**
We used Morisky Green Levine Scale to assess the medication adherence in Parkinsonism patients. Patient counselling was given to the patients and patient' care giver. The counselling involved information about the drugs, dose, dosage, indication and side effects. A daily drug adherence chart was given to the patient's care taker and was requested to mark in the specified columns when the patients has taken the drug. This helps the patient to understand if they had taken the drug or not.

We analysed the MGL score in total population. During the first review, the score was found to be 2.25+/-0.81. At the end of the study, it has increased to 3.63+/-0.48. The improvement in the medication adherence was found to be 61.33%.

Many participants reported that people with PD, and their caregivers, occasionally forget to take their PD medication on time. Episodic information on the timing of doses is, itself, subject to age-related memory loss. However, acting against forgetfulness are factors such as wearing off and "on-off" phenomena, and the perceived importance by lay people of administering PD medication on time to relieve motor symptoms.

Many other studies showed that reduced medication adherence in Parkinsonism patients. A study done by Yu-Jung Wei, et al.[5] on medication adherence in parkinsonism patients said that higher adherence to antiparkinsonian drugs and longer duration of use of antiparkinsonian drugs were associated with lower all-cause health care utilization and total health care expenditures. However, little is known about the impact of no adherence of antiparkinsonian medication on the development and severity of motor complications later in the course of the disease (Bainbridge &Ruscin, 2009[11]). Family caregivers assist the individual with PD in safety, medication compliance, activities of daily living, and social involvement (Cifu et al., 2006[12]). As Schrag, Hovris, Morley, Quinn, and Jahanshahi(2006) [7] noted, caregivers of people with PD experience a significant burden affecting physical, emotional, and social aspects of their quality of life.

## Analysis of PDQL Score

The mean score of PDQL of total population at the initial visit was 104.38+/-17.40 and at end of the study its 113.98+/18.90. the improvement showed that 9.19%. Among the 4 stages, the patients with stage 1, 2 and 3 showed a significant improvement in their quality of life at the time of last follow up compared to initial one. But stage 4 population doesn't show much improvement their quality of life. Because their condition was worse than the rest of study population.

We assessed health-related quality of life using the PDQL- which was significantly different between each stage groups of PD. Two other studies done by Kuopio et al[8] and Schrag et al.[10] showed that total score of PDQ-39 was significantly worse in stage 4 patients. We must also acknowledge the lesser sample size in the similar study performed by Kuopio et al. However, similar to Kuopio et al. we also demonstrated that the score on "emotional wellbeing" as a domain of the PDQL-39 was significantly poorer in EOPD patients. Results from multivariate regression analysis in our study showed that psychiatric features, namely, depression and anxiety, were the factors that mainly affected QoL in the whole PD population.

## Patient Counselling

However, it must be acknowledged that PD is a progressive disease. In the early stages, many people with PD would be able to manage their medications independently; however, in the moderate to advanced stages, they may need additional help and support.

Most of the patients are not much aware of their disease and its condition. Many patients with stage 1 Parkinsonism were not able to accept their disease condition and they were much worried about the symptoms. In advanced disease most of the patients were not able to do their daily activities including handling the utensils, cooking, hygiene and they were not able to put their signature.

During our study we provide brief information about the disease to the patients, dietary advice and life style modifications measures were given to the patient. Information about each prescribed drug and the importance of taking medication properly was advised to the patient. To improve the medication adherence a medication adherence chart was provided and the patient was advised to mark in the chart after taking the medication

## LIMITATIONS

Limitations of the study include lack of a control group and lack of long-term follow up data. Parkinsonism being a slowly progressive neurodegenerative disorder and more time is required for getting a complete over view of each patient. Sample size of the study was small (n=104). More accurate results may be obtained in a larger cohort. MGL scale is 4 questionnaire scale. So, the score variations between patients and stages were less. No disease specific medication adherence scale was there for Parkinsonism.

## CONCLUSION

This study shows the impact of patient counselling to improve the medication adherence and the quality of life of Parkinson's disease patients. Quality of life of most of the Parkinson's disease patients are compromised, it is mainly due to the lack of knowledge about the disease and poor medication adherence of the patients.

Patient counselling provides a great opportunity to improve the medication adherence of the patient and symptomatic improvement was also observed, further more we also assess the prescribing pattern of Parkinson's disease in a tertiary care sector from which we came to observe that levodopa is the most commonly prescribed drug in monotherapy and among combination therapy levodopa and others are most commonly prescribed drugs.

Our study provides a descriptive overview of the use of antiparkinsonian agents in a tertiary care hospital in Kerala. It will be pertinent to investigate if the upward trends in use of Levodopa, Amantadine, Entacapone, and Ropinirole continue in the future and how such trends might be influenced by the introduction of new medications into the market.

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