Original Article

Elderly Population Has Higher Prevalence of Polypharmacy Associated with Poor Quality of Life and Low Compliance after Recovery from COVID-19

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Abstract

Background: Long term effects of COVID are not fully understood yet. The geriatric population has been badly affected. The impact of COVID-19 on the health-related quality of life after recovery and patient compliance is a matter of concern especially in the geriatric population where polypharmacy is often prevalent. **Aims and Objectives:** This study intended to observe the occurrence of polypharmacy (PP) among COVID-19 recovered older patients with multimorbidity and explore its association with health-related quality of life and compliance in these patients. **Materials and Methods:** Total 90 patients, above 60 years of age having two or more co-morbidities and recovered from COVID-19 infection were included in this cross-sectional study. Number of pills taken daily by each patient was noted, to determine the occurrence of PP. WHO-QOL-BREF was used to assess the effect of PP on health-related quality of life (HRQOL). Medication adherence was measured using a self-reported questionnaire. **Results:** PP was found in 94.4% while hyper polypharmacy was found in 45.56% of patients. The overall mean score of HRQOL in patients with PP was 187.91 ± 32.98, indicating poor quality of life with PP (p value 0.0014) whereas the overall mean score of HRQOL in patients with hyper polypharmacy was 177.41 ± 26.11, showing poor quality of life with hyper polypharmacy (p value 0.0005). Increased number of pills corelated with poor quality of life (r =0.49). The medication adherence was found to be poor in patients who received mean number of pills 10.44 ± 2.62 whereas the adherence was good if the mean number of pills was 8.20 ± 2.63, (p value of 0.0001). **Conclusion:** Polypharmacy is highly prevalent among COVID-19 recovered patients and is associated with poor quality of life as well as poor medication adherence.

Keywords: *Health-related quality of life, hyperpolpharmacy, medication adherence, pill burden, polypharmacy*

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Introduction

The elderly population with a higher prevalence of frailty and comorbidities is at utmost risk from COVID-19 infection. The World Health Organization (WHO) reports that 95% of COVID-19 deaths occurred in older adults >60 years, more than 50% of all deaths were in people >80 years; 8 of 10 deaths had at least one underlying comorbidity, in particular cardiovascular diseases, hypertension, diabetes, and a range of other chronic conditions.[1,2]

Long-term as well as short-term effects of COVID are being increasingly recognized.[3,4] In a study done in Norway by Sudre *et al*., lower scores were observed in the quality of life (QOL) domain in individuals who recovered from COVID-19 compared to the general

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population. In another retrospective study, it was observed that COVID survivors suffered from substantial neurological and psychiatric morbidity.[5-7]

There is no strong consensus on the definition of polypharmacy, yet some may define it based on the number of medications taken by a person. It may be possible that in the elderly population, polypharmacy acts as a risk factor for the death procession of COVID-19.[8,9] There is some evidence that frailty, multimorbidity, obesity, and physical and mental health status are independent risk factors for polypharmacy.[10-12] Few studies have reported that polypharmacy causes gait impairment and increases the risk of falls in the elderly.[13] A relationship between depression and number of medications taken has also been suggested.[14] Most studies that have explored the relationship between the QOL and polypharmacy have done so from the perspective of adherence,[15,16] not focusing on the elderly population which had survived the COVID infection.

A common issue for elderly people with multiple comorbidities is nonadherence to prescriptions. It is estimated that 30%–50% of elderly patients are nonadherent to medication. Older people are more susceptible to nonadherence due to polypharmacy and owing to the constraints, such as physical, mental, and cognitive impairments.[17]

There is scanty literature to provide evidence of the association between polypharmacy and COVID-19 infection and how it affects the QOL in patients and compliance, especially in patients who have multiple morbidities and recently recovered from COVID-19 infection. The present study was designed to estimate the prevalence of polypharmacy in COVID-recovered elderly patients and find the association with the QOL in the physical, psychological, social, and environmental domains and its relation to medication adherence.

Materials and Methods

Study setting

The current cross-sectional study was conducted in the Department of Pharmacology and Medicine at the Guru Teg Bahadur Hospital and the University College of Medical Sciences in New Delhi. Individuals who had recovered from COVID-19 were invited to participate in the study between January 2021 and August 2021. Individuals above 60 years of age having two or more comorbidities (diabetes, hypertension, chronic obstructive pulmonary disease [COPD], dyslipidemia, coronary artery disease [CAD], and osteoarthritis) and recovered from COVID-19 infection (at 3–6 months) were included in the study. The patients included had any one of the diseases, for at least 3 years and at maximum for 10 years.

Study duration

The sample of 90 people was chosen over 7–8 months: January 2021–August 2021. Analysis of the data was carried out over the next month with compilation and presentation of data by September 2021.

Ethical clearance

The study was initiated after clearance from the Institutional Ethics Committee (IEC), University College of Medical Sciences, Delhi (Dated 6.10.2019 Approval number:IEC-HR/2019/41/128). Participants were recruited after informed and verbal consent and adequate care was taken to maintain confidentiality.

Methodology

After informed consent, the participants qualifying the inclusion and exclusion criteria were included and interviewed for polypharmacy (number of drugs and pill burden); health-related QOL (HRQOL) (as measured by the WHOQOL of brief version [WHOQOL-BREF]) and medications adherence were measured with a self-reported questionnaire.

Patients were evaluated for other variables of interest that may confound or mediate the relationship including (a) demographic profile (including age, sex, marital status, living arrangements, address, education, and literacy), (b) clinical parameters (comorbidity profile, complications, and duration of illness), (c) functional status (activities of daily living determined by the Barthel Index), (d) social parameters (social support), and (e) depression (identified using Geriatric Depression Scale).

Statistical analysis

Stata version 17 was used for the statistical analysis of all data.

Results

Demographic characteristics

A total of 90 patients were enrolled in the study. Table 1 describes the baseline demographic and descriptive characteristics of the study population. The age of the patients ranged from 60 to 86 years, with a mean age of 65.82 ± 5.79 years. More than 50% (n = 55) of the studied patients were between 60 and 65 years of age, 21% (n = 19) were aged between 66 and 70 years, 11% (n = 10) were aged between 71 and 75 years, 4% (n = 4) were aged between 76 and 80 years, and 2% (n = 2) were aged over 80 years age.

Among 90 patients in this study, 51% (n = 46) were males and 49% (n = 44) were females. Out of total

of 90 patients, 76.66% (n = 69) were educated and 23.33% (n = 21) were illiterate. Out of the total educated patients, 20.28% (n = 14) have completed primary school, 8.69% (n = 6) have completed middle school, 11.59% (n = 8) have completed high school, 17.39% (n = 12) have completed intermediate/diploma, and 42.02% (n = 29) are graduate degree holders.

Comorbidity profile

The majority of the patients (100) were found to have two or more than two comorbidities. A total of 90 patients (100%) had hypertension and type 2 diabetes mellitus. Out of a total of 90 patients, 18.89% (n = 17) had CAD, 8.89% (n = 8) had hypothyroidism, and 4.44% (n = 4) had COPD.

Polypharmacy-related variables

Among 90 patients, 94.4% (n = 85) had polypharmacy, taking more than equal to 5 pills daily and 45.56% (n = 41) had hyper polypharmacy, taking more than equal to 10 pills per day [Table 2]. 47.78% (n = 43) had good compliance, whereas 52.22% (n = 47) had poor compliance of medications. 47.78% (n = 43) of patients were taking self-administered medications. 18.89% (n = 17) of patients were found to have past bad experiences with medications. Among all patients, 46.67% (n = 42) took nondrug treatments which mostly included herbal/Ayurvedic drugs.

63.33% (n = 57) took wrong drug for the disease and 67.78% (n = 61) had inappropriate timing of drug. In 91.11% (n = 82) of patients, there was no drug abuse (unregulated overuse), whereas 8.89% (n = 8) had unregulated overuse of drugs. Among all patients, 70% (n = 63) were able to identify the medicines with diseases.

Polypharmacy and health-related quality of life

According to the WHOQOL-BREF, the mean score of four domains, physical domain, psychological domain, social domain, and environmental domain was 49.64 ± 9.18, 47.74 ± 8.36, 39.51 ± 11.48, and 53.73 ± 10.44, respectively, in all patients [Table 3].

Association between polypharmacy and health-related quality of life

The overall mean score of HRQOL in patients with polypharmacy was 187.91 ± 32.98, indicating poor QOL with polypharmacy, with significant P = 0.0014, whereas the overall mean score of HRQOL in patients with no polypharmacy was 236.8 ± 9.85.

The overall mean score of HRQOL in patients with hyperpolypharmacy was 177.41 ± 26.11, showing poor QOL with hyper polypharmacy, whereas the overall mean score of HRQOL in patients with no hyperpolypharmacy was 201.69 ± 36.12 with significant P = 0.0005.

Table 1: Demographic and descriptive characteristics

Variable	Population distribution (n=90), n (%)
Age (years)	65.82±5.79
Gender	
Male	46 (51)
Female	44 (49)
GDS score	4.17±0.79
Barthel's Index	83.94±16.73
Education status	
Illiterate	21 (23.33)
Primary	14 (20.28)
Middle school	6 (8.69)
High school	8 (11.59)
Intermediate/diploma	12 (17.39)
Graduate	29 (42.02)
Comorbidity profile	
Hypertension	90 (100)
Type 2 diabetes mellitus	90 (100)
CAD	17 (18.89)
Hypothyroidism	8 (8.89)
COPD	4 (4.44)

Values are described as mean±SD or frequency (%) as applicable. GDS: Geriatric Depression Scale, CAD: Coronary artery disease, COPD: Chronic obstructive pulmonary disorder, SD: Standard deviation

Table 2: Polypharmacy-related variables

Variable	Distribution in the population (n=90), n (%)
Polypharmacy	85 (94.4)
Hyperpolypharmacy	41 (45.56)
Daily pill intake	9.38±2.84
Self-administered medications	43 (47.78)
Past bad experiences with medications	17 (18.89)
Nondrug treatments	42 (46.67)
Wrong drug for disease	57 (63.33)
Inappropriate timing of drug	61 (67.78)
Drug abuse (unregulated overuse)	8 (8.89)
Identify medicines with disease	63 (70)

Values have been described as mean±SD or frequency (%) as applicable. SD: Standard deviation

The correlation coefficient (r) between pill burden (marker for polypharmacy) and quality of life was found to be -0.49 (p value of 0.00), indicating poor quality of life with increased number of pills [Table 4].

Association between polypharmacy and adherence

The medication adherence was found to be poor in patients who received the mean number of pills of 10.44 ± 2.62, whereas the adherence was good if the mean number of pills was 8.20 ± 2.63, (P = 0.0001).

Patients who had polypharmacy, medication adherence was found to be good in 11.63%, whereas patients who

Table 3: Distribution of health-related quality of life domain using the World Health Organization quality of life instrument among COVID-19-recovered geriatric population

Variables	Mean±SD
Physical domain	49.64±9.18
Psychological domain	47.74±8.36
Social domain	39.51±11.48
Environmental domain	53.73±10.44

HRQOL: Health-related quality of life, WHOQOL-BREF: World Health Organization quality of life of brief version

Table 4: Association between polypharmacy and hyperpolypharmacy with health-related quality of life

Group	Mean±SD (HRQOL)	*P*
Polypharmacy	187.91±32.98	0.0014
No polypharmacy	236.80±9.85	
Hyperpolypharmacy	177.41±26.11	0.0005
No hyperpolypharmacy	201.69±36.12	

The correlation coefficient (*r*) between pill burden and quality of life= −0.49 (*P* value of 0.00). HRQOL: Health-related quality of life, SD: Standard deviation

Table 5: Association between polypharmacy and adherence and quality of life

Variable	Polypharmacy (*n*=85[a], *n*=41[b])	No polypharmacy (*n*=5[a], *n*=49[b])	*P*
HRQOL	187.91±32.98[a]	236.80±9.85[a]	0.0014[a],*
	177.41±26.11[b]	201.69±36.12[b]	0.0005[b],*
Medical adherence	11.63%[a]	88.37%[a]	0.016[a],*
	32.56%[b]	67.44%[b]	0.018[b],*

**P* value is significant (*P*<0.05), [a]Data for polypharmacy, [b]The data for hyperpolypharmacy. Values are described as mean±SD or frequency (%) as applicable. HRQOL is measured by the WHOQOL-BREF. WHOQOL-BREF: World Health Organization quality of life of brief version, HRQOL: Health-related quality of life, SD: Standard deviation

did not have polypharmacy adherence was good in 88.37% (*P* = 0.016). Patients having hyperpolypharmacy, adherence was good only in 32.56%, whereas patients who did not have hyperpolypharmacy adherence was good in 67.44% (*P* = 0.018) [Table 5].

Discussion

Polypharmacy, defined as the use of at least five medications, is commonly seen in older adults. There are several factors that can lead to polypharmacy. Patient-related factors include multiple medical conditions, chronic mental health conditions, and residing in a long-term care facility. Systems-level factors include poorly updated medical records, automated refill services, and prescribing to meet disease-specific quality metrics.[18] Studies have suggested the possibility that in the elderly population, polypharmacy may act as a risk factor for the death procession of COVID-19.[9] Hence, the elderly population which had suffered COVID infection could be a vulnerable group susceptible to polypharmacy.

International research has shown that nearly 50% of older adults take one or more medications that are not medically necessary. Research has also clearly established a strong relationship between polypharmacy and negative clinical consequences. There are many negative consequences associated with polypharmacy. Specifically, polypharmacy has been associated with greater health-care costs and an increased risk of adverse drug events, drug interactions, medication nonadherence, reduced functional capacity, and multiple geriatric syndromes.[19] The most worrying concern of polypharmacy is not only the association of polypharmacy with adverse drug reactions but also its effect on the patient's QOL.

Generally, older people often receive multiple medications for multiple chronic conditions, often resulting in polypharmacy (concomitant use of 5–9 medicines) and hyperpolypharmacy (concomitant use of ≥10 medicines).[20] Research shows that in India, older adults frequently use multiple medications. Although medications are essential for the improvement of patient's health status and QOL, suboptimal prescribing and the use of multiple medications may cause adverse outcomes.[21]

In the present study, we observed the prevalence of polypharmacy in tertiary care hospitals in Delhi in the COVID-19-recovered geriatric population with multimorbidity. The association between polypharmacy and QOL using the WHOQOL-BREF was assessed in our study.

A total of 90 geriatric COVID-19-recovered patients with multimorbidity were enrolled for the study. It was observed that the occurrence of polypharmacy and hyperpolypharmacy was 94.44% (*n* = 85) and 45.56% (*n* = 41) in patients who recovered from COVID-19 infection with multimorbidity.

A study done by McQueenie *et al.* in the United Kingdom has shown that out of the total patients who tested positive for COVID-19, 37.7% had polypharmacy.[22] A similar study was observed by Sun *et al.*, in China which observed 100% polypharmacy in COVID-19-positive patients.[23]

Few studies have used numerical definitions of polypharmacy which incorporated the duration of therapy in the definition. The definitions of polypharmacy involving the duration of therapy, ranged from the use of two or more medications for more than 240 days to five to nine medications used for 90 days

or more.[24] Some of the studies have defined appropriate or rational polypharmacy or recognized the distinction between appropriate and inappropriate medications.[25] These studies have used polypharmacy tools such as Beers criteria and the Medication Appropriateness Index to define polypharmacy.[26]

It has emerged from the present study that polypharmacy can be defined on the basis of the number of pills taken daily by patients. There is no strong consensus on the definition of polypharmacy. In this study, we defined polypharmacy as the >8 pills taken daily by the patients, whereas hyperpolypharmacy can be defined as >10 pills taken daily.

The presence of polypharmacy among COVID-19-recovered patients suggests that polypharmacy is associated with adverse clinical outcomes in such patients. This is consistent with the result of other studies that have reported the negative clinical impact of polypharmacy on different viral and respiratory diseases such as pneumonia and influenza.[27]

To explore the relationship between HRQOL and polypharmacy, it was observed in the present study that with polypharmacy, there was a significant decrease in QOL in all the domains. We observed a correlation between pill burden and HRQOL, indicating poor QOL with increased number of pills ($r = 0.49$).

Our observations were in line with the study done by Schenker *et al*., who concluded that higher polypharmacy was associated with higher symptom burden and lower QOL.[28] Tegegn *et al*. aimed to assess medication-related QOL among older patients with polypharmacy. The study also showed that the poor QoL associated with medications was very high thus strengthening our observation further.[29] Egede *et al*. 2022 have recently reported the influence of COVID-19 on physical HRQOL and stress.[3] Our study further emphasizes the negative impact of COVID on the QOL in the geriatric population, where polypharmacy was prevalent.

In the present study of sample size 90, it was noted that 52.22% of poly-medicated elderlies were nonadherent. We noted that nonadherence was attributed to forgetfulness, difficulties in managing medication, concerns with side effects, the price of medication, doubt about the need for the medication, and the lack of trust for some medicines, showing that the elderly's behavior, beliefs, and attitudes have an impact on medication adherence.

Nonadherence to medication could lead to the lack of effectiveness of treatment, increased hospital visits, health-care expenditures, and ultimately leading to overtreatment of a disease.[25] Due to the presence of multimorbidities that require multiple therapies and consequently polypharmacy, elderlies are more prone to compliance problems.[26]

A study done by Bushardt *et al*. evaluated medication adherence in older adults exposed to chronic polypharmacy and showed similar results. The study proved that low medication adherence was found in community-dwelling older people on chronic polypharmacy.[30] Another study done by Fried *et al*. also concluded that polypharmacy, diabetes mellitus, and difficulty in taking medication were prognostic factors for the lack of adherence to treatment in patients of more than 65 years.[27]

As the population is aging rapidly, the necessity for immediate and effective polypharmacy management has been prioritized to decrease the risks and costs of prescriptions and improve medication adherence. There is a need for larger studies that follow patients throughout life to improve the understanding of factors predicting polypharmacy and their impact on QOL and compliance.

The findings from this study provide further evidence for the argument in favor of deprescribing, especially among older patients with COVID-19. Since deprescribing has proved to prevent medication harm in patients, there is a need to incorporate it in the pharmacotherapeutic management of COVID-19 patients having polypharmacy.

Further studies in a larger population are required to know the potentially inappropriate medication being prescribed to older adults to reduce polypharmacy. This deprescribing can lead to a reduction in number of medications, which can be responsible for improvement in QOL in older adults along with better medication adherence.

This study was done in a single health-care system with a small sample size. For establishing the generalizability of the results, a larger sample size is needed. In evaluating the QOL, there remain some variables that have not captured, including community-level factors that could have an influence on long-term health. Long-term clinical assessment post-COVID could throw further light on the life of the elderly population.

Conclusion

The present study showed a high prevalence of polypharmacy (94.4%) and hyperpolypharmacy (45.6%) in older adults with multimorbidity who recently recovered from COVID-19 infection. This high

prevalence of polypharmacy may be responsible for adverse clinical outcomes in COVID-19 patients. This study observed a poor HRQOL in patients with polypharmacy indicating that a high number of medications are responsible for poor QOL.

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Conflicts of interest

There are no conflicts of interest.

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