ORIGINAL RESEARCH ARTICLE

Predictors of Dependency in Instrumental Activities of Daily Living Among Community Dwelling Elderly in A Rural Field Practice Area of a Tertiary Care Hospital in Chengalpattu District, Tamil Nadu, India- A Cross-Sectional Study

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ABSTRACT

Background: Longer lifespans of elderly are associated with chronic illnesses that impair functioning, making it harder to carry out daily activities and making assistance necessary. The aim was to estimate the prevalence of dependence in Instrumental Activities of Daily Living (IADL) among elderly and to determine its sociodemographic and health related predictors.

Methodology: This cross-sectional study was conducted among elderly in Chengalpattu district from December 2023 to May 2024. Sample size was determined by multistage random sampling. A semi-structured questionnaire consisting of sociodemographic details and Lawton scale to assess dependence were used to collect data. Data was entered in Ms Excel and analysed using SPSS version 26.

Results: Mean age of participants was 67.4 ± 7.4 years. 131 (43.7%) of them were at risk of malnutrition and 83 (27.7%) were malnourished. Majority (n=178,59.3%) experienced increased IADL dependency. Binary logistic regression analysis showed increasing age, lower socioeconomic status, Divorced/Widowed/Unmarried, smoking and tobacco use, hospitalizations within previous year were significant predictors of IADL dependency.

Conclusions: The study concluded that a considerable proportion of our study population was suffering from IADL dependency (59.3%), with majority demonstrating mild to moderate degree of dependency. To prevent disease in its early stages, arrangements can be made for community-based extensive geriatric health assessments.

Key-words: Elderly, Lawton, IADL, Tamil Nadu, India

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INTRODUCTION

The percentage of the population that is 60 years of age or older is increasing, according to data from the World Health Organization. In 2019, there were one billion people in the world who were sixty years of age or older. This figure is expected to rise to 1.4 billion by 2030 and 2.1 billion by 2050. This rise is occurring at a rate that has never been witnessed before, and it will accelerate in the next decades, particularly in countries that are developing.[1] Life expectancy has increased during the past few decades worldwide as a result of improved living conditions, advancements in technology and medicine, and other factors.[2] According to current demographic forecasts, the percentage of older individuals is expected to rise further.[3] India in particular would have an even bigger growth rate in the senior population category in developing nations.[4] The proportion of senior citizens in India has increased as a result of increasing longevity and diminishing fertility. A higher burden of disease and functional disability in older adults is implied by their larger share.[5]

To safeguard the health of India's aging population, the public health system has made this its top concern. For the majority of older adults, maintaining one's functional ability is crucial. The limitation of one's capacity to carry out fundamental ADLs (ability to carry out daily living activities) and instrumental ADLs (IADL) independently is the definition of functional status. Seniors' social well-being is impacted by their performance in this area in addition to its relevance to their physical and mental health. Longer lifespans are associated with chronic illnesses that impair functioning, making it harder to carry out daily activities and making assistance necessary. Reduced severe disability can lead to an improvement in quality of life. Studies concerning persons 70 years of age and older indicated that the prevalence of IADL-Disability varied between 27% to almost 40%, and the prevalence of ADL disability diversified around 13% to 40%.[6,7] IADL are more closely associated with psychosocial, intellectual, and economic capacity than ADL, which are primarily dependent on bodily and health-related variables.[8] Furthermore, IADL decline typically occur before ADL constraints, which means that they can be used as a predictor of future ADL deficits.[9] As functional disability rises with age, it is critical that health care professionals acknowledge functional disability as an issue that requires scrutiny on par with primary chronic conditions.

Malnutrition is a significant public health focus because it affects 1 in 3 individuals globally, according to the 2016 Global Nutrition Report.[10] Depending on the subgroup under study, studies indicate that between 31 and 46 percent of the older population is at risk for malnutrition.[11] In older adults, lower functional capacity and higher morbidity are linked to poor nutritional status.[12] These can be avoided if elderly individuals' nutritional status is evaluated using basic nutritional methods and malnutrition is promptly treated. Research indicates that the chance of incapacity or dependency is increased in females, the elderly, and those with chronic illnesses.[13-16]

Since diminution in IADL generally precedes restrictions in ADL. the objective of this study is to estimate the prevalence of IADL dependency among the elderly and to determine its sociodemographic and health related predictors.

METHODOLOGY

Study setting and duration: A cross-sectional study was conducted among elderly people residing in a rural field practice area of a tertiary care hospital, Chengalpattu district. Study period was from Dec 2023-June 2024.

Sample size calculation and sampling method: Based on a comprehensive review of literature, the prevalence of functional dependence among elderly was **21.8%.**[17] Taking this as prevalence, 5% absolute error, and Z value of 1.96, using the formula $n=Z^2 PQ/d^2$, the calculated sample size was 272. Adding a 10% non- response rate to this, the sample size arrived to 299 study subjects. Final sample size was rounded off to 300 and was determined by multistage random sampling technique. All 9 villages under rural field practice area of the tertiary care hospital were included in the study. From the list of houses enumerated from the Rural Health Training Centre (RHTC) family folders, systematic random sampling was done. Every 10th house from the list was selected for each and every village. Participant from each house who satisfied the study criteria was included. If the particular house member didn't satisfy the criteria or if they did not give consent, then successive house was taken for the study. The sample population from each village was determined by Probability Proportion to Size. Consent from the host scientific and ethical committee (clearance number: SRMIEC-ST0723-553) was obtained. After obtaining comprehensive details regarding the study's objectives, protocols, possible hazards, and advantages, each participant gave their informed consent. Participants were given assurances regarding the security of the data they submitted and the freedom to discontinue the study at any time without fear of repercussions. Following institutional ethical committee clearance and after obtaining permission from the respective village's Head, the data collection was started.

Inclusion criteria: All senior citizens who agreed to participate and whose stay in the research region lasted longer than six months were included. The participants were requested to sign a consent form stating their willingness to participate after being told about the study.

Exclusion criteria: Older adults who were guests and did not live in the designated study region were

not included. Individuals with terminal illnesses or severe mental disorders were not included, nor were those who had not provided consent.

Data collection tools: A self-reporting semi structured questionnaire was used consisting of four sections. Sociodemographic profile of study participants was the focal point of the first section of the questionnaire. The second section had questions about their health.

The third section was about measurement of Nutritional status. A total of eighteen items comprise the Mini Nutritional Assessment (MNA), which has good levels of reliability (Cronbach's alpha > 0.7) assessing four distinct areas: anthropometric parameters (weight loss, Body Mass Index, mid-arm and mid-calf circumferences); general evaluation (lifestyle, pharmaceuticals, movement, and signs of feeling depressed); short nutritional assessment (the number of meals, calorie and water intake); and subjective review (self-perception regarding dietary habits and nutrition). Patients were placed into three groups according to the score. A score of 17 or below out of 30 is deemed malnourished, 17–23.5 indicates at risk of malnutrition, and 24 or higher reflects normalcy.[18]

The last section was about the measure of IADL. An appropriate tool for evaluating independent living skills is the Lawton Instrumental Activities of Daily Living Scale (IADL),[19] having high levels of reliability (Cronbach's alpha = 0.8). The tool is most helpful in determining a person's current functional level and detecting any changes or decline over time. The Lawton IADL scale measures eight domains of function: phone use, purchasing, meal preparation, housework, washing clothes, transportation, responsibility to take medicines, and managing finances. Traditionally, men have not been evaluated for food preparation, housekeeping, and laundry. All eight functional domains are assessed for women. The highest level of functioning an individual can achieve in that category is used to assign a score. For women, a summary score falls between 0 and 8 (high function, independent), while for men, it runs from 0 and 5. The scale's item responses were divided into two categories: "able to do the activity without help" and "unable to do the activity at all/need some help." It obtains a 0–4 dependent score for women and a 5-8 independent score. It is rated as 0–2 dependent and 3-5 independent for men. When distributing the questionnaire, a participant's response was taken into consideration based on whether or not he or she is capable of carrying out the activity, if they do not regularly conduct it such as cooking, housework, or shopping. To be compatible with the current study settings, the questionnaire was modified.

Statistical Analysis: The data was entered in Ms Excel and the results were analysed using SPSS Version 26. Frequency and proportion were used to represent categorical variables. By using inferential statistics like chi-square test to analyse the data, a statistically significant difference between discrete variables in the two groups was determined. A p-value <0.05 was deemed statistically significant. In order to find significant predictors while accounting for potential confounders, variables exhibiting a statistically significant association with the outcome variable in the bivariate analysis were further analysed using binary logistic regression. Odds ratio or adjusted odds ratio with a 95% confidence interval was used to quantify the strength of the association between categorical variables.

RESULTS

Out of 300 study participants, 138 (46%) were aged <65 years. The mean age of the participants was 67.4 ± 7.4 (Mean ± SD) years. With 167 (55.7%) female and 133 (44.3%) male participants, the study's gender distribution was about equal. Out of 300, 119 (39.7%) were unemployed and 15 (5%) were retired. Majority of the study participants (39.7%) belonged to lower middle class. 173 (57.7%) of them were married while others were unmarried/divorced/widowed. 100 participants (33.3%) were living alone. Majority of the participants were non-smokers (58.7%) and non-alcoholics (64%). Nearly 51 % of participants were current tobacco users. 101 (33.7%) participants have been hospitalised during the past 1 year. 131 (43.7%) were at risk of malnutrition and 83 (27.7%) were malnourished. Comorbidities were present in 77.3% of study participants (Table 1).

The participant's dependency in instrumental activities of daily living was evaluated based on independent living skills using Lawton IADL scale. 57% (171/300) of elderly reported they were dependent on others to look up and dial numbers in telephone, followed by higher dependency (47%) for taking medications in correct dosages at correct time. Minimum dependency (17.3%) was found in housekeeping domain (Table 2).

The study participants' distribution of dependency in instrumental activities of daily living according to Lawton scale are shown in Figure 1. According to Lawton scale, majority of individuals (n=178,59.3%) experienced increased levels of dependency in IADL. The mean IADL score in this study was 3.59±1.8.

Table 3 displays the association between several sociodemographic characteristics and IADL dependency categories determined using chi square tests. Significant association (p-value = <0.001) was determined between age and IADL dependency, with those over 65 experiencing greater dependency (75.9%) than those under 65. Gender had a significant association (p-value = <0.001) with IADL dependency, with males having more dependency. Those belonging to lower socio-economic status showed a higher percentage of dependency (63.5%), which was statistically significant by chi-square test

Table 1: Sociodemographic distribution of the study participants (n = 300)

Variables	Participants (%)
Age	
<65 years	138 (46)
65-75 years	123 (41)
>75	39 (13)
Gender	
Male	133 (44.3)
Female	167 (55.7)
Occupation	
Employed	100 (33.3)
Agricultural work	66 (22)
Retired	15 (5)
Unemployed	119 (39.7)
Socioeconomic status	
Upper	37 (12.3)
Upper middle	33 (11)
Middle	27 (9)
Lower middle	119 (39.7)
Lower	84 (28)
Marital status	
Married	173 (57.7)
Divorced/Widowed/ Unmarried	127 (42.3)
Type of family	
Nuclear	116 (38.7)
Three generation	60 (20)
Joint	18 (6)
Supported by caretaker/relative	6 (2)
Living alone	100 (33.3)
Smoking	
Former smoker	42 (14)
Non-smoker	176 (58.7)
Current smoker	82 (27.3)
Tobacco user	
Former user	38 (12.7)
Non-tobacco user	109 (36.3)
Current user	153 (51)
Alcohol intake	
Past alcoholic	25 (8.3)
Non-alcoholic	192 (64)
Current alcoholic	83 (27.7)
Hospitalized during past 1 year	101 (33.7)
MNA category	
Normal nutritional status	86 (28.7)
At risk of malnutrition	131 (43.7)
Malnourished	83 (27.7)
Comorbidities Present	232 (77.3)

(p-value=0.022). There was a significant difference in IADL dependency based on marital status (p-value 0.008). Divorced/Widowed/Unmarried (67.7%) exhibited more dependency than married people. Those who were living alone reported higher IADL dependency (74%) with significant association (p-value = <0.001). Habits of smoking (p-value = <0.001) and tobacco usage (p-value = <0.001) was significantly associated with dependency, with smokers (78.2%) and tobacco users (71.7%) reporting higher dependency. Alcoholics (70.4%) showed higher dependency with significant association (p-value = 0.002). Those who were hospitalised during past 1 year had significantly higher dependency (67.3%, p-value = 0.029). There was a significant association between MNA category and IADL dependency (p-value = 0.045). Elderly at risk of malnutrition and malnourished showed higher dependency (62.6%). Comorbidities had significant association with IADL dependency, as indicated by the chi-square test (p-value= 0.021). There was no significant association between occupation and IADL dependency.

On further analysis using binary logistic regression (Table 4), a significant association was found between IADL dependency and age (p-value = <0.001).

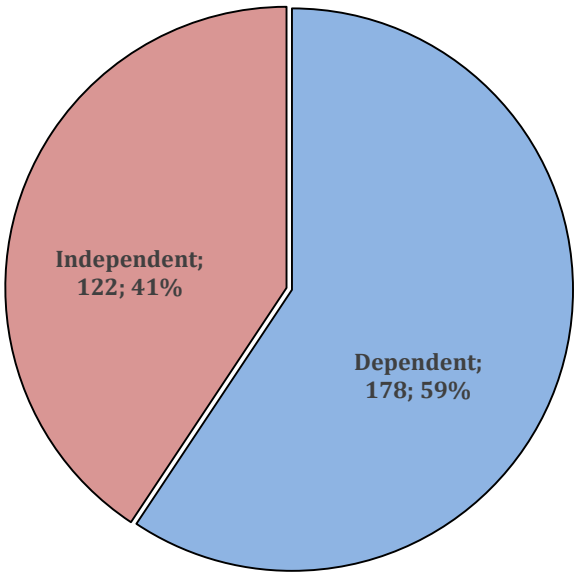

Figure 1: Distribution of IADL dependency among study participants (n=300)

Table 2: Responses of the participants to Lawton Instrumental Activities of Daily Living Scale (IADL) (n=300)

Activities	Dependent (%)	Independent (%)	NA
Ability to Use Telephone	171(57)	129(43)	-
Shopping	140(46.7)	160(53.3)	-
Food Preparation	77(25.7)	90(30)	133(44.3)
Housekeeping	52(17.3)	115(38.3)	133(44.3)
Laundry	65(21.7)	102(34)	133(44.3)
Mode of Transportation	140(46.7)	160(53.3)	-
Responsibility for Own Medications	141(47)	159(53)	-
Ability to Handle Finances	138(46)	162(54)	-

Table 3: Association between various sociodemographic variables and IADL dependency

Variables	Dependent (%)	Independent (%)	Total (n=300)	χ^2 square	P value
Age					
<65 years	55(39.9)	83(60.1)	138	40.184	<0.001*
>65 years	123(75.9)	39(24.1)	162		
Gender					
Male	101(75.9)	32(24.1)	133	27.307	<0.001*
Female	77(46.1)	90(53.9)	167		
Occupation					
Employed	101(60.8)	65(39.2)	166	0.351	0.317
Unemployed	77(57.5)	57(42.5)	134		
Socioeconomic status					
Upper & middle	49(50.5)	48(49.5)	97	4.619	0.022*
Lower	129(63.5)	74(36.5)	203		
Marital status					
Married	92(53.2)	81(46.8)	173	6.414	0.008*
Divorced/Widowed/Unmarried	86(67.7)	41(32.3)	127		
Living alone					
Yes	74(74)	26(26)	100	13.373	<0.001*
No	104(52)	96(48)	200		
Smoking					
Smoker	97(78.2)	27(21.8)	124	31.266	<0.001*
Never	81(46)	95(54)	176		
Tobacco usage					
Tobacco user	137(71.7)	54(28.3)	191	33.469	<0.001*
Never	41(37.6)	68(62.4)	109		
Alcohol intake					
Alcoholic	76(70.4)	32(29.6)	108	8.519	0.002*
Never	102(53.1)	90(46.9)	192		
Hospitalized during past 1 year					
Yes	68(67.3)	33(32.7)	101	4.032	0.029*
No	110(55.3)	89(44.7)	199		
MNA category					
Normal nutritional status	44(51.2)	42(48.8)	86	3.336	0.045*
At risk of malnutrition & malnourished	134(62.6)	80(37.4)	214		
Comorbidities					
Present	130(56)	102(44)	232	4.616	0.021*
Absent	48(70.6)	20(29.4)	68		

*Statistically significant at p-value <0.05

Elderly people aged more than 65 years were found to be five times more dependent compared to those less than 65 years of age (OR = 5.28, 95% CI = 2.62-10.66). Those who belonged to lower socioeconomic status are likely to be four times more dependent than upper- and middle-class people (OR = 4.75, 95% CI = 1.76-12.78). Divorced/Widowed/Unmarried were 5 times more likely to be dependent than married (OR = 5.87, 95% CI = 1.91-18.02).

Significant association (p<0.05) was found between IADL dependency and smoking/tobacco usage. Smokers and tobacco users had an 8-fold higher likelihood of exhibiting IADL dependency compared to nonsmokers (OR = 8.21, 95% CI = 1.53-44.07) and non-tobacco users (OR = 8.30, 95% CI = 3.42-20.16) respectively. The odds of being dependent on others for their instrumental activities of daily living was three times higher among those who had been hospitalized within the previous year (OR = 3.34, 95% CI = 1.57-7.10).

Logistic regression analysis found that gender, living alone, alcohol status, nutritional status and presence of comorbidities did not significantly influence IADL dependence.

DISCUSSION

The study participants were put into categories based on their IADL score, with a mean score of 3.59±1.8. These findings show that study participants generally experienced mild to moderate dependence. Nonetheless, there was a significant range of reliance among the research population. Our study revealed that majority of elderly (59.3%) reported mild to moderate levels of IADL dependency, which is identical to a study done among community-dwelling older adults in India whose prevalence of IADL dependency was around 48.4%.[20] Chi square analysis revealed that, with the exception of occupation, all the other variables in this study had a significant association with IADL dependence. In contrast to another study[21], which found that women reported more health-related IADL constraints than men, our research revealed that men were more dependent than women. Living alone was associated with significantly greater rates of IADL disability than living with others, according to a different study conducted among older individuals in Norway.[22] This outcome is consistent with the findings of our investigation.

Table 4: Binary logistic regression analysis of factors associated with IADL dependence

Variables	Unadjusted OR (95% CI)	p value	Adjusted OR (95% CI)	p value
Age				
<65 years	Reference	<0.001	Reference	<0.001*
>65 years	**0.21**(0.12-0.34)		**5.28**(2.62-10.66)	
Gender				
Male	0.27(0.16-0.44)	<0.001	3.24(0.38-27.23)	0.278
Female	Reference		Reference	
Socioeconomic status				
Upper & middle	Reference	0.022	Reference	0.002*
Lower	**1.70**(1.04-2.78)		**4.75**(1.76-12.78)	
Marital status				
Married	Reference	0.008	Reference	0.002*
Divorced/Widowed/ Unmarried	**0.54**(0.33-0.87)		**5.87**(1.91-18.02)	
Living alone				
Yes	0.38(0.22-0.64)	<0.001	1.11(0.37-3.29)	0.85
No	Reference		Reference	
Smoking				
Smoker	**0.23**(0.14-0.39)	<0.001	**8.21**(1.53-44.07)	0.014*
Never	Reference		Reference	
Tobacco usage				
Tobacco user	**0.23**(0.14-0.39)	<0.001	**8.30**(3.42-20.16)	<0.001*
Never	Reference		Reference	
Alcohol intake				
Alcoholic	2.09(1.27-3.45)	0.002	2.92(0.57-14.89)	0.196
Never	Reference		Reference	
Hospitalised during past 1 year				
Yes	**0.60**(0.36-0.99)	0.029	**3.34**(1.57-7.10)	0.002*
No	Reference		Reference	
MNA category				
Normal nutritional status	Reference	0.045	Reference	0.728
At risk of malnutrition & malnourished	1.59(0.96-2.65)		1.14(0.53-2.47)	
Comorbidities				
Present	1.88(1.05-3.37)	0.021	0.54(0.22-1.30)	0.174
Absent	Reference		Reference	

*Statistically significant at p-value <0.05

Similar to another study[23] that found former drinkers had a higher likelihood of restrictions in instrumental activities of daily living compared to non-drinkers, our study also pointed out that alcoholics were more dependent on IADLs. This can be the result of long-term abuse of alcohol, which might have accelerated their cognitive decline and caused memory issues, concentration issues, and poor judgment. Planning, organizing, and carrying out duties like handling funds would have been difficult due to these cognitive deficiencies. Dependence in IADL is associated with higher nutritional risk in elderly[24] and this finding is similar to the current study.

Although many factors showed significant associations with IADL dependency using chi square test, binary logistic regression analysis showed that increasing age, lower socioeconomic status, Divorced/Widowed/Unmarried, smoking and tobacco use, hospitalizations within the previous year were found to be the significant predictors of IADL dependency. The results of the present study, which found that older adults over 65 were more reliant, are consistent with findings from another study that, even after adjusting for other characteristics, indicated that older adults, particularly those over 80, were much more likely to experience IADL challenges.[25] Dependency on IADLs had a significant association with lower socioeconomic level. Their limited access to high-quality medical care, preventive programs, and prescription drugs may be the cause of this, as it has been linked to worse health outcomes and a higher risk of functional decline. Among older people who live in communities, being single is linked to an elevated chance of IADL disability.[26] This outcome is in line with our research, which discovered that older adults who were widowed, divorced or single relied more on IADLs. This could be as a result of older adults who are single having fewer professional caregivers or smaller networks of social support. Tasks like food preparation, transport, or taking medications may become challenging as a result. Similar to a prior study conducted among senior citizens in Japan, which found that smoking is linked to a deterioration in instrumental activities of daily living, the current study revealed that smoking is strongly associated with dependency.[27] Tobacco use was found to have a strong association with dependence on instrumental activities of daily life. The cause could be attributed to the various toxic compounds included in tobacco smoke, which can lead to oxidative damage and chronic inflammation of the system. Tissue degradation, rapid aging, and decline in function may be caused by these processes. The musculo-

skeletal system is one of the many organ systems that can be impacted by prolonged inflammation and oxidative stress, which can cause discomfort, weakness, and reduced mobility. An increased likelihood of developing a new IADL dependent after discharge has been linked to a deterioration in cognitive functioning during hospitalization, according to another study.[28] This result is consistent with that of our study, which showed that elderly people with a history of hospitalization during the previous year had a higher dependency on IADLs than did other adults. The cause for this can be due to hospitalization leading to musculoskeletal weakening and degeneration, making it harder to execute jobs that need stamina and perseverance. Mobility can be hampered by illness, surgery, or extended recuperation, making it difficult to go around on one's own or accomplish activities that require standing or walking. Community-based programs could focus on regular nutritional assessments using validated tools like MNA to identify and address malnutrition early. Similarly, integrating smoking cessation support into routine geriatric care could mitigate the high dependency rates linked to tobacco use. Post-hospitalization rehabilitation programs may also play a critical role in preserving functional independence among the elderly.

Limitations

This study contains a few drawbacks that should be taken into account, notwithstanding its positives.

Another possible limitation is recall bias, where participants may have answered inaccurately out of forgetfulness or wanting to appear more positive. The responses may have also been impacted by a bias towards social desire, especially in cases where the questions dealt with delicate topics like drinking and smoking. One of our study's limitations is that we primarily analysed homebound elderly in a specific rural area of Chengalpattu district, excluding the elderly from healthcare facilities and those living in old age amenities. This restricts the generalizability of our findings. Moreover, the cross-sectional design of the study barriers our ability to investigate any temporal relationships. Longitudinal study designs in the future may yield additional insights into these associations.

Conclusion

In summary, the study found that 59.3% of the participants in the research encountered an IADL dependency, with the greater part of them showing mild to moderate dependence. The findings of the study highlight the significance of focused interventions for senior citizens, especially those classified as high-risk groups (e.g., those over 65, less affluent, or with a history of hospitalization). Healthcare professionals can use these factors to prioritize geriatric assessments, and policymakers should concentrate on improving rural communities' access to nutrition programs and geriatric care. Improved social support networks and smoking cessation awareness programs are two community-level initiatives that could help reduce IADL dependency even more. Effective resource allocation and the creation of elder care strategies that are adapted to regional requirements can both be facilitated by these insights.

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Authors' Contributions:

Study conception- ML, MVMP, VVA; Study Design- ML, AH, MVMP; Data collection-ML; Data analysis and interpretation- ML, AH, LM; Manuscript preparation- ML, AH, VVA, MVMP

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