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**Prevalence and spectrum of functional disability among sample of outpatient attendants to geriatric clinic in Baghdad Teaching Hospital**

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**Abstract**

Functional disability represents the commonest cause of the decline in health status above 60 years old. Among the elderly population, the clinician needs to assess functional capacity to get an improvement in health status and nursing care for a better quality of life. Assesses the prevalence and spectrum of functional disability among the elderly. A total sample of 400 patients from the attended geriatric outpatient clinic at Baghdad Teaching Hospital /Medical City Center of both genders aged  $\geq 60$  years. Data collected by using a questionnaire consists of socio-demographic factors and chronic diseases, six items of the Katz index for basic activities of daily living (BADL), and eight items of the Lawton index for instrumental activities of daily living (IADL) for functional capacity assessment. The total prevalence of functional disability in the elderly sample for basic activities of daily living and instrumental activities of daily living was 4.5% and 10.8% respectively. Incontinence represents the highest percentage of dependency among basic activities of daily living followed by bathing, while food preparation, shopping, and responsibility for own medications are among instrumental activities of daily living in an elderly sample. There was a positive significant association between functional disability with age, gender, and marital status variables in association with basic activities of daily living performance, while a positive significant association was found between functional disability with age, gender, educational level, and occupation variables in association with instrumental activities of daily living performance. The level of independence for both basic activities of daily living and instrumental activities of daily living was relatively high. Dependency was significantly associated with advanced age, female gender, marital status, educational level, and occupation of the participants.

**Keywords:** Functional disability, Geriatric, Independency, Katz, Lawton scale

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## Introduction

The physical activity represents the wide potential for health benefits in elderly people (1). Functional capacity represents the maintenance of physical and mental abilities to carry out a set of required activities of daily life which are reflected in welfare and quality of life as an important indicator of geriatric health. These daily activities are the basic activities of daily living (BADLs) and instrumental activities of daily living (IADLs) (2, 3). BADLs represent necessary activities for self-care (e.g. bathing, dressing, transferring, toileting, continence, and feeding). While IADLs represent activities that allow independence in social life (e.g. telephone use, shopping, food preparation, housekeeping, laundry, mode of transportation, responsibility for own medication, and ability to handle finances) (4, 5, 6, 7), however, given rising age, functional disability or functional impairment is the difficulty or inability to performing BADLs within the normal standards of human being, the main cause of this limitation to doing BADLs was the physical deficiency (2).

The decline in the performance of BADLs in elderly people limits autonomy which causes dependence, usually, these activity limitations generate complications throughout time which were instrumental activity limitation IADLs that require high economic expenses including long-term care (3). However, elderly people who are conducted to nursing homes because of many factors associated with loss of functional capacity and required periodic skilled or specific care that cannot be presented by most people within the home environment, also insufficient financial support may be directly affected independence, so measurement of functional disability can provide a good value for functional status of elderly which was the first step to prevents disability complications and decrease in morbidity and mortality (4, 5). There are many techniques to measure functional disability in the elderly but commonly measured by self-report or questionnaire and interview that the clinician can easily estimate the health status of the patient, one of the most common scoring systems is Katz and Lawton index (6, 7). Katz index is the most appropriate scoring system to assess functional status as a measurement of the ability to perform basic daily living activities, the clinicians can typically use this tool to detect a problem in performing BADLs and planning care accordingly. Katz index assesses BADLs and higher sensitivity for the decline of health status in the elderly but doesn't assess more advanced activities of daily living. So, developed another score for instrumental activities of daily living, which is called the Lawton score (8). The elderly population represents 5% of the total Iraqi population aged  $\geq 60$  years old female represents 52.7% of them while male 47.3%. Between 2015 and 2050 the world's population  $\geq 60$  years could nearly double from 12%-22%. This population aging predictably leads to an increase in disability and a raise in national health burden (9, 10, 11). Normal aging processes and the association of common physical illnesses among the elderly such

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as

diabetes mellitus, hypertension, ischemic heart disease, cancer, psychological disorders, and social environment problems. The health status frequently shows a decline in the functional capacity of old people which leads to further health problems (4, 6). Information on geriatric health and functional disability in Iraq was limited. One of the best ways to evaluate the health status of the elderly was through Functional assessment which provides objective data that may improve health status, provide high-quality nursing care, determines proper healthcare needs, rehabilitation of elderly people, and can provide a basis for high-quality health and social services, which was multidimensional related to many factors like demographic, socioeconomic determinants, health condition, lifestyles and characteristic of the physical and social environment (12). The Aims of this research:

1. To determine the prevalence and spectrum of functional disabilities among a sample of elderly people.
2. To find a possible association between socio-demographic factors and functional disability.

### Patients and methods

A cross-sectional study with the analytic element. The Sample was collected from a geriatric outpatient clinic in Baghdad Teaching Hospital /Medical City Center. The study was held at a period from 30th January to 30th July/2022. The Data was collected from 400 patients who attended the clinic of both genders aged  $\geq 60$  years. The sample size was obtained by a sample size calculator (13).

$$Sample\ size = \frac{z^2 \left( \frac{p(1-p)}{e^2} \right)}{1 + \left( z^2 \left( \frac{p(1-p)}{e^2 N} \right) \right)}$$

Where:

n= sample size

z= z-score of the confidence interval of 95% = 1.96

p= standard deviation = 0.5

Population proportion = 50

e= margin of error 5% = 0.5

N= population size = 3364 (no. of a patient who has file clinic).

The result was 345. However, the sample size taken in the study was 400. Inclusion criteria; male and female elderly people  $\geq 60$  years, who have filed clinic (registered). The Exclusion criteria are; elderly individuals having congenital handicaps and who refused the interview. The questionnaire used for data collection written in the English language obtained for the study consists of three parts:

- Part one: socio-demographic factors and chronic diseases.
- Part two: 6 items of Katz index.
- Part three: 8 items of Lawton score.

The exposure variables were socio-demographic variables includes; age, gender, marital status, educational level, source of income or financial dependence, occupation, and living status, and another variable was the presence of chronic disease. The Katz index for BADLs assessment includes 6 items; bathing, dressing, toileting, continence, and feeding, given 1 (independent; or can-do activity without help) or 0 (dependent; or can't do the activity without help) for each item, then sum the total points (6-8). After the summation of total points, we get numbers from (0-6), see Table (1):

Table (1): The Katz index and Level of functional capacity (6-8).

| Katz index | Level of functional capacity              |
|------------|---|
| $\geq 5$   | Independent or mild functional impairment |
| 4-3        | Moderate functional impairment            |
| $\leq 2$   | Severe functional impairment              |

Dependence or functional disability is defined as; need assistant to perform partial or total BADLs (6,7,8). Lawton index for IADLs assessment includes 8 items; ability to use telephone, shop, food preparation, housekeeping, laundry, mode of transportation, responsibility for own medication, and ability to handle finances, given 1 or 0 for each item, then sum the total points. Functionally disabled means; needing assistance to perform IADLs. And to avoid gender bias (6, 7, 16), see Table (2):

Table (2): The Lawton score for Men and Women (6-7,16).

| Lawton score | Men | Women |
|--------------|-----|-------|
| Independent  | 4-5 | 6-8   |
| Dependent    | 0-3 | 0-5   |

Only the highest level of function receives a 1; in others, two or more levels have scores of 1 because each describes competence that represents some minimal level of function. The Data was collected by direct interview with the patient who attended the clinic for 7-10 minutes after getting verbal consent for

the participation of the study, after clarifying the aim of the study, participants were asked about each question orally and marked the score for each item of questionnaire accordingly. The Ethical committee approval was obtained from the Arab board for health specialties in Iraq to conduct an analytic cross-sectional study beside ethical consideration and agreement of the situation of study at the outpatient clinic of geriatric at Baghdad Teaching Hospital /Medical City Center. Verbal consent was obtained from all patients after clarification of the aim of the study. The Data was analyzed statistically by the IBM-SPSS version 27 software program, P-value less than 0.05 considered significant.

## Results

Socio-demographic characteristics of geriatric participants are shown in Table (3): Out of 400 total participants, the highest age group was (60-69 years) which represents 184 (46%). Males were 257(64.3%). The married individual's group was 85.5%, Regarding educational level; the secondary education group got the highest percentage, 28.7% of participants. Two hundred sixty-six (66.5%) of them were self-financial dependent, regarded occupation 63.7% were retired. Regarding their living status, 384(96%) of participants were living with their families. Those with more than one chronic disease were 224 individuals (56%).

Table (3). Socio-demographic characteristics of geriatric participants.

| Socio-demographic characteristics | N=400 % | 100%  |
|-----------------------------------|---------|-------|
| Age group                         |         |       |
| 60-69                             | 184     | 46    |
| 70-79                             | 165     | 41.25 |
| 80-89                             | 47      | 11.75 |
| ≥90                               | 4       | 1     |
| Gender                            |         |       |
| Male                              | 257     | 64.3  |
| Female                            | 143     | 35.8  |
| Marital status                    |         |       |
| Unmarried                         | 4       | 1.0   |
| Married                           | 342     | 85.5  |
| Divorce or separated              | 5       | 1.3   |
| Widowed                           | 49      | 12.2  |
| Educational level                 |         |       |
| Illiterate                        | 87      | 21.8  |
| Primary                           | 99      | 24.7  |
| Secondary                         | 115     | 28.7  |
| Collage                           | 91      | 22.8  |
| Higher education                  | 8       | 2.0   |
| Financial dependence              |         |       |
| Self                              | 266     | 66.5  |
| Family                            | 43      | 10.7  |
| Others                            | 51      | 12.8  |
| More than 1 source                | 40      | 10.0  |
| Occupation                        |         |       |
| Retired                           | 255     | 63.7  |
| Employed                          | 36      | 9.0   |
| Unemployed                        | 109     | 27.3  |
| Living status                     |         |       |
| With family                       | 384     | 96.0  |
| Alone                             | 16      | 4.0   |
| Chronic disease                   |         |       |
| no                                | 46      | 11.5  |
| one                               | 130     | 32.5  |
| > 1                               | 224     | 56    |

The highest percentage of dependency for BADLs was continence (12.8%), followed by bathing showed (4.3%), transferring (4%), dressing (3.3%), toileting (2.5%), while feeding showed the least percentage (1.3%), as shown in table (4):

Table (4): Frequency distribution of geriatric participants according to BADLs performance.

| BADLs        | Indepe<br>ndent N | %    | Depe<br>ndent<br>N | %    |
|--------------|-------------------|------|--------------------|------|
| Bathing      | 383               | 95.7 | 17                 | 4.3  |
| Dressing     | 387               | 96.7 | 13                 | 3.3  |
| Toileting    | 390               | 97.5 | 10                 | 2.5  |
| Transferring | 384               | 96.0 | 16                 | 4.0  |
| Continence   | 349               | 87.2 | 51                 | 12.8 |
| Feeding      | 395               | 98.7 | 5                  | 1.3  |

According to Katz's basic activities of daily living index classification, 382 (95.5%) participants had the full functional capacity or mild functional impairment, 6 (1.5%) participants with moderate functional impairment, and only 12 (3%) participants had a severe functional impairment, the total prevalence of functional disability for BADLs was 4.5% (moderate plus severe functional impairment), as shown in table (5):

Table (5): Frequency distribution of geriatric participants according to Katz index classification for functional capacity to perform BADLs.

| Functional capacity              | N   | %    |
|----------------------------------|-----|------|
| Full function or mild impairment | 382 | 95.5 |
| Moderate impairment              | 6   | 1.5  |
| Severe impairment                | 12  | 3    |
| Total                            | 400 | 100  |

The association of dependency of participants measured by Katz the index to perform BADLs in association with socio-demographic characteristics shown in Table (6), Dependency among those in the age group (60-69) was (4.9%), dependency increased with an increase in age, was (75%) of age group ( $\geq 90$ ) were dependent. There is a significant association between functional capacities to perform BADLs with aging, the p-value was less than 0.05. Among males, 251 (97.6%) of them were independent, and 6(2.4%) were dependent. Among females, 131 (91.6%) of them were independent, 12 (8.4%) were dependent, and there was a significant association between gender and functional capacity for daily

activities, the p-value was 0.045. All unmarried and all divorced or separated elderly participants were independent, while 329 (96.2%) of the married group and 44 (93.6%) of the widowed group were independent, there was a significant association between marital status and Katz index, and the p-value was 0.025. Regarding educational level, (97.8%) of the college-level group and all of the higher education group were independent. There was no significant association between functional capacities to perform BADLs with educational level in the elderly sample, the p-value was 0.824. There was no significant association between financial dependence and the ability to perform the BADLs, the p-value was 0.874, where those who are independent represent (95.5%) of the self-financial dependent group, (95.3%) of the family dependent group, (92.2%) of those who are financially dependent on others rather than their families and All of those who are financially dependent on more than one source of income were independent. There is no significant association between functional disability in the elderly to perform BADLs and employment, the p-value was 0.312, where (97.2%) of the employed group were independent. All lived alone group and (95.3%) of those who lived with their families were independent because the others group was zero, so used Yates's correction for continuity for this situation to correct the error introduced by assuming that the discrete probabilities of frequencies in the table can be approximated by a continuous distribution in Chi-square test. And the same will be used in Table (6). There was no significant association between the ability to perform the BADLs and the living status of the elderly sample, the p-value was 0.870. Also, there was no significant association between the presence or absence of chronic diseases and the ability to perform the BADLs, the p-value was 0.803, and only (2.3%) of those with one chronic disease and (6.7%) of those with more than one chronic disease were dependent.



Table (6): Association between the dependency status of participants and their sociodemographic characteristics.

| Socio-demographic characteristics | Katz, N=400           |      |                    |     | P-value |
|-----------------------------------|-----------------------|------|--------------------|-----|---------|
|                                   | Independent<br>n1=382 | %    | Dependent<br>n2=18 | %   |         |
| Age group                         |                       |      |                    |     | 0.000   |
| 60-69                             | 175                   | 95.1 | 9                  | 4.9 |         |
| 70-79                             | 163                   | 98.8 | 2                  | 1.2 |         |
| 80-89                             | 43                    | 91.5 | 4                  | 8.5 |         |
| ≥90                               | 1                     | 25   | 3                  | 75  |         |
| Gender                            |                       |      |                    |     | 0.045   |
| Male                              | 251                   | 97.6 | 6                  | 2.4 |         |
| Female                            | 131                   | 91.6 | 12                 | 8.4 |         |
| Marital status                    |                       |      |                    |     | 0.025   |
| Unmarried                         | 4                     | 100  | 0                  | 0   |         |
| Married                           | 329                   | 96.2 | 13                 | 3.8 |         |
| Divorce or separated              | 5                     | 100  | 0                  | 0   |         |
| Widowed                           | 44                    | 93.6 | 5                  | 7.4 | 0.824   |
| Educational level                 |                       |      |                    |     |         |
| Illiterate                        | 80                    | 92   | 7                  | 8   |         |
| Primary                           | 96                    | 97   | 3                  | 3   |         |
| Secondary                         | 109                   | 94.8 | 6                  | 5.2 |         |
| Collage                           | 89                    | 97.8 | 2                  | 2.2 |         |
| Higher education                  | 8                     | 100  | 0                  | 0   | 0.874   |
| Financial dependence              |                       |      |                    |     |         |
| Self                              | 254                   | 95.5 | 12                 | 4.5 |         |
| Family                            | 41                    | 95.3 | 2                  | 4.7 |         |
| Others                            | 47                    | 92.2 | 4                  | 7.8 | 0.312   |
| Combined 2and more                | 40                    | 100  | 0                  | 0   |         |
| Occupation                        |                       |      |                    |     |         |
| Retired                           | 246                   | 96.5 | 9                  | 3.5 | 0.870   |
| Employed                          | 35                    | 97.2 | 1                  | 2.8 |         |
| Unemployed                        | 101                   | 92.7 | 8                  | 7.3 |         |
| Living status                     |                       |      |                    |     | 0.803   |
| With family                       | 366                   | 95.3 | 18                 | 4.7 |         |
| Alone                             | 16                    | 100  | 0                  | 0   | 0.803   |
| Chronic disease                   |                       |      |                    |     |         |
| No                                | 46                    | 100  | 0                  | 0   |         |
| One                               | 127                   | 97.7 | 3                  | 2.3 |         |
| > 1                               | 209                   | 93.3 | 15                 | 6.7 |         |

The highest percentage of dependency for IADLs was among food preparation which represents (56.7%), shopping (42.8%), responsibility for own medication (30.8%), laundry (23.5%), ability to handle finances (19.5%), mode of transportation (15.5%), ability to use the telephone (9.3%) and the least percentage was housekeeping (8%), as shown in table (7):

Table (7): Frequency distribution of geriatric participants according to IADLs performance.

| IADLs                              | Independent | %    | Dependent | %    |
|------------------------------------|-------------|------|-----------|------|
| Ability to use Telephone           | 363         | 90.7 | 37        | 9.3  |
| shopping                           | 229         | 57.2 | 171       | 42.8 |
| Food preparation                   | 173         | 43.3 | 227       | 56.7 |
| housekeeping                       | 368         | 92.0 | 32        | 8.0  |
| laundry                            | 306         | 76.5 | 94        | 23.5 |
| Mode of transportation             | 338         | 84.5 | 62        | 15.5 |
| Responsibility for own Medications | 277         | 69.2 | 123       | 30.8 |
| Ability to Handle finances         | 322         | 80.5 | 78        | 19.5 |

According to Lawton's score of instrumental activities of daily living classification, independent were 357(89.2%), 16 (4%) were need assistance, 15 (3.8%) were more able, and 12(3%) of the elderly sample were less able or unable to doing IADLs, and, the total prevalence of functional disability for IADLs was 10.8%, as shown in table (8):

Table (8): Frequency distribution of geriatric participants according to Lawton score classification for functional capacity to perform IADLs.

| Functional capacity |                   | n  | %   |
|---------------------|-------------------|----|-----|
| Less able           | Dependent<br>n=43 | 12 | 3   |
| More able           |                   | 15 | 3.8 |

|                 |  |     |      |
|-----------------|--|-----|------|
| Need Assistance |  | 16  | 4    |
| Independent     |  | 357 | 89.2 |
| Total           |  | 400 | 100  |

Association between Lawton score and sociodemographic characteristics shown in Table (9), Dependency increase with age; were (14.9%) of those with age group (80-89), while all of the age group ( $\geq 90$ ) were dependent. There was a significant association between functional capacities to perform IADLs with aging, the p-value was less than 0.001. Dependency in females was more than in males, (17.5%) of the female group was dependent, while (7%) of the male group was dependent. There was a significant association between gender and functional capacity for instrumental activities, the p-value was less than 0.001. All unmarried, divorced, or separated groups and (90.9%) of the married group were independent, while only (75.5%) of those in the widowed group were independent, there was no significant association between marital status and Lawton score, and the p-value was 0.168. The illiterate group shows more dependency than other groups where 22 out of 87 (25.3%) of the illiterate group were dependent. There was a significant association between functional capacities to perform IADLs with educational level in the elderly sample, the p-value was less than 0.001. Self-financial dependent group and family financial dependent group (7.9%), (and 9.3%) respectively, showed less functional dependency than the group who depend on others (21.6%), there was no significant association between financial dependence and the ability to perform the IADLs, the p-value was 0.069. There was a significant association between functional disability in the elderly to perform IADLs and employment, the p-value was 0.003, were among the unemployed group dependency represent (19.3%) of them. Of those who are living with their families, (88.8%) of them were independent, while all of the groups who are living alone were independent. No significant association between the ability to perform the IADLs and the living status of the elderly sample, the p-value was 0.483. Dependency was more in the group that had more than one chronic disease where (13.9%) of them were dependent and (4.4%) of the group without any chronic disease were dependent, with no significant association between the presence or absence of chronic diseases and the ability to perform the IADLs, the p-value was 0.325.

Table (9): Association between the dependency of participants to perform IADLs and their sociodemographic characteristics.

| Socio-demographic characteristics | Lawton, N=400         |   |                    |   | P-value |
|-----------------------------------|-----------------------|---|--------------------|---|---------|
|                                   | Independent<br>n1=357 | % | Dependent<br>n2=43 | % |         |
| Age group                         |                       |   |                    |   | < 0.001 |

|                      |     |      |    |      |         |
|----------------------|-----|------|----|------|---------|
| 60-69                | 171 | 92.9 | 13 | 7.1  |         |
| 70-79                | 146 | 88.5 | 19 | 11.5 |         |
| 80-89                | 40  | 85.1 | 7  | 14.9 |         |
| ≥90                  | 0   | 0    | 4  | 100  |         |
| Gender               |     |      |    |      |         |
| Male                 | 239 | 93   | 18 | 7    | < 0.001 |
| Female               | 118 | 82.5 | 25 | 17.5 |         |
| Marital status       |     |      |    |      |         |
| Unmarried            | 4   | 100  | 0  | 0    | 0.168   |
| Married              | 311 | 90.9 | 31 | 9.1  |         |
| Divorce or separated | 5   | 100  | 0  | 0    |         |
| Widowed              | 37  | 75.5 | 12 | 24.5 |         |
| Educational level    |     |      |    |      |         |
| Illiterate           | 65  | 74.7 | 22 | 25.3 | 0.000   |
| Primary              | 87  | 87.9 | 12 | 12.1 |         |
| Secondary            | 108 | 93.9 | 7  | 6.1  |         |
| Collage              | 90  | 99   | 1  | 1    |         |
| Higher education     | 7   | 87.5 | 1  | 12.5 |         |
| Financial dependence |     |      |    |      |         |
| Self                 | 245 | 92.1 | 21 | 7.9  | 0.069   |
| Family               | 39  | 90.7 | 4  | 9.3  |         |
| Others               | 40  | 78.4 | 11 | 21.6 |         |
| Combined 2and more   | 33  | 82.5 | 7  | 17.5 |         |
| Occupation           |     |      |    |      |         |
| Retired              | 234 | 91.8 | 21 | 8.2  | 0.003   |
| Employed             | 35  | 97.2 | 1  | 2.8  |         |
| Unemployed           | 88  | 80.7 | 21 | 19.3 |         |
| Living status        |     |      |    |      |         |
| With family          | 341 | 88.8 | 43 | 11.2 | 0.483   |
| Alone                | 16  | 100  | 0  | 0    |         |
| Chronic disease      |     |      |    |      |         |
| No                   | 44  | 95.6 | 2  | 4.4  | 0.325   |
| One                  | 120 | 92.3 | 10 | 7.7  |         |
| > 1                  | 193 | 86.1 | 31 | 13.9 |         |

## Discussion

Functional disability assessment has great importance for geriatric health care planning since it gives an overview of the common physical impairments among the elderly population, it is important for elderly health care as a screening for functional impairment which may help in reducing secondary morbidity like depression after physical impairment (2).

Most of the participants were in the age group of 60 – 69 years, while in a study done in Iraq-Kurdistan Region in 2017, the age range of the participants was  $71.88 \pm 8.94$  years which might be due to that the study was conducted in geriatric homes residents having a younger age group of elderly (17). The male percentage is approximately double females in this sample, which may be related to the chance of sampling process for those who attended the clinic. A population-based study done in Brazil in 2008 showed 63% of the sample size were females (18), while a study done in 135 PHCCs, in Al-Riyadh City in 2021, were female represented 55.6% of the sample size.

Each community has its characteristics which could be similar in many of them, Iraqi people have a high rate of marriage and many of them live with their families, and this is clear in this study, the same results in studies done in Japan, Delhi, and Al-Riyadh City showed that married group represented 63.4% (20), 66.9% (21) and 69.4% (19).

The participants were aged  $\geq 60$  years, so the majority were retired, since the retirement age in Iraq is 60 years, an Indian study conducted in 2 urbanized villages showed that the retired elderly percentage was only 9.7% of the sample (21), while the retired participants in the Saudi study represented 37.1% participating individuals, and the majority were unemployed (19). Participants without chronic diseases were only 11.5% of the whole sample, so the majority with chronic diseases, this result was found in many studies of different countries (18, 21).

The worldwide prevalence is approximately 10 and 30% for basic and instrumental activities limitation (15), in this study the overall prevalence of functional disability to perform BADLs which was 4.5%, while for IADLs was 10.8%, however, this result may not represent the true result in the individuals because this study evaluated only elderly patients who were able to attend the health clinic and the situation of study at the urban community which has better access to health care facilities. Dependency was 10.6% and 34.2% for BADLs and IADLs respectively, in a population-based study in Bage-Brazil (18), in an urban region in Malaysia 33.5% of PHC-attended elderly were dependent for IADLs (2), and in 2 urbanized villages in India found 25.6% of participants were dependent for BADLs (21).

In this study, the prevalence of functional disability was higher for IADLs compared to BADLs, thus, the explanation of this common result is related to many factors; like health status, cognition, hearing, vision, level of education, socio-economic status, lifestyle, chronic diseases, environmental factors, medications in addition to other socio-demographic factors, in other word IADLs disability precedes the onset of BADLs disability, a person with BADLs disability likely already show impairment in IADLs, but not vice versa. IADLs functionally are multifaceted and cognitively challenging (related to a decrease in the level of cognitive, sensory, and motor function) and highly affected by the quality of life than BADLs, which require less efficiency of such systems (functionally involves aspects related to functional mobility) (18, 22).

Functional disability is more with increasing age with both Katz and Lawton with more disability with Lawton, and there was significant association of elderly dependency and age in both BADLs and IADLs, this agree with many studies because rising of age cause physiological cognitive impairment and many changes in posture and musculoskeletal system and special sense, a study was conducted in two urbanized villages of East Delhi-India at 2020 showed the functional disability was 2.6 times more likely to be in participants aged  $\geq 70$  years, with significant association between aging and functional disability (21), prevalence of functional disability in an elderly general population of Japanese was 20.1% and the prevalence increased with age and doubled with every 5-years increment in age and the main cause of functional disability is dementia in women and stroke in men (20), there was significant association between aging and functional disability in study done in China (23), other research done by WHO on disability in elderly has identified the non-modifiable risk factors, age and its related diseases is the important one as well as other factors (24).

Female participants showed lower capacity to preform BADLs and IADLs than male (with avoidance of potential gender bias that applied in the scoring system) which is again more predominant with IADLs, with significant association between functional disability to preform BADLs and IADLs with gender, This may be due-to that female greater experience in their self-care functioning than male during aging, in addition to many physiological factors difference related to musculoskeletal contour, distress, chronic diseases, violence, hormonal and accumulative effect of pregnancy, and child bearing, this result agree with many studies (23, 25), a study performed in USA geriatric population, explained that women have higher life expectancy than men but higher functionally disable morbidity (26), and also differ from result of other studies that showed females get higher functional disability than males with no significant association between functional disability and gender (21), in a study done on general elderly Japanese population demonstrated that the prevalence of

functional disability increased steeply with age, and its higher in women than the men especially in individual aged 85 or older and disabled women had a greater incidence than men of orthopedic diseases such as fracture and arthritis (20), a possible explanation for this sex difference given in many studies among them is the death rates for underlying disease; women might be survive with some form of disability after developing cardiovascular disease, while men might be more likely to die immediately after incident disease(newly diagnosed of disease), another possible explanation given is that musculoskeletal diseases may have a greater influence on functional limitation in women than men, the women had greater incidence of orthopedic diseases like fracture and arthritis than men (20, 21, 26).

In this study widowed and married elderly participants got more functional impairment to perform BADLs and IADLs than others and again is predominant with IADLs with a significant association between functional disability for BADLs and marital status but no such association with IADLs, these data agree with many kinds of literature that showed a low score of Katz and Lawton index among married elderly, and more disability within the divorced and widowed group, in research done by Daigo Yoshida among Japanese population was divorced and widowed get the higher percentage of disability (20), and same result in another study which was significantly associated (18), while in other studies were no significant association found (25, 27), the reasons given for this differences is that it might be due to the quality of sampling, community characteristics, and marriage responsibilities, in addition to the psychological status of a person and its effects on functional capacity related to marital status.

Educational level affects both BADLs and IADLs in this study, and is also more prominent with IADLs (same as age and gender), with significant association with IADLs but not with BADLs. Some studies showed the prevalence of functional disability is high among low educational level elderly, with a significant association between them as in a study done in Kurdistan-Iraq (17), and a Brazilian study (18), since IADLs need good cognitive status while BADLs do not, other studies showed no significant association as in study done in two villages of East Delhi (21), in Bangladesh and Brazil (25, 28), many studies explained that in form of education can improve the cognition of person that refers to the understanding of concepts and ability to think and reasons.

The results were no significant association between financial dependence and functional capacity for BADLs and IADLs, but a lower prevalence of functional disability among self financially dependent for BADLs and IADLs, financially self-dependent elderly may have good access to health services and better quality of life, in a study performed in 2020 showed the health of financially dependent elderly are usually neglected as financial status

often determine the social status and many of elderly who are financially dependent are depends on their family members for other needs too (21).

Occupation showed a significant association with functional disability for IADLs, while it affects BADLs but there is no significant association with it. This result agrees with a study done in Delhi, which found that disability was higher within the unemployed group (21). A study done among the rural elderly in Anhui, China revealed a correlation between disability status and quality of life (23). More disability was found in those who lived with their families but living status showed no significant association with functional disability for both BADLs and IADLs. In a study done in two urbanized villages of East Delhi in 2020, the majority (78.1%) of elderly participants lived in a joint family (21), while a study done in Brazil showed functional deficiency for IADLs was greater among those who were illiterate, and lower among the elderly people who lived alone when compared to those living with a spouse, partner or family (29). This difference may be due to the difference in communities, cultures, habits, presence of multiple responsibilities and psychological status of old people which is affected by environmental factors and members who live with and the ability of these factors to improve functional status among elderly in addition to that elderly living alone tends to help themselves by carrying out work required for daily living.

Despite no significant association between functional disability for BADLs and IADLs and chronic diseases in this study, an elderly group with more than one chronic disease had the highest percentage of dependency to perform BADLs and IADLs. Normal aging changes and health problems are often reflected in a decrease in functional capacity, making them less independent, and less safe and making daily tasks much harder for them. Most studies showed a correlation of functional dependency in the elderly with more than one chronic disease, with a significant association between them (21), other study showed the effect of a high number of chronic diseases in addition to vision, hearing impairment, medications, poor nutritional status, other associated treatment modalities, history of fall in last two years, body mass index, physical pain, and depression which increase functional disability with a significant association between them (27), elderly people who had any of chronic disease were more likely to be functionally disabled due to decrease in quality of life and social isolation and found the presence of chronic disease is to be a significant predictor of functional disability (23, 30).

BADLs and IADLs give information on people who while not dependent, do report some difficulty in performing self-care activities. Regarding BADLs performance, most dependencies were with incontinence and then for bathing and transferring, this may be due to the physiological aging process, and the presence of chronic diseases like diabetes mellitus and depression (28).



A study done in Malaysia in a rural area found that urinary incontinence represents the highest percentage of dependency among BADLs for a sample of the geriatric population, and the characteristics of a rural region affect the prevalence of functional disability among elderly like; low educational level, low income, bad hygiene habits and others (31). A study done in India found most BADLs' performance dependency for incontinence with difficulty in transferring and using the toilet (32). While in another study in India found on applying Barthel's Index of ADL (BADLs) the restriction for climbing stairs was more than it was for transfer (33), in the Brazilian study, the highest prevalence of disability was for the basic activity of urination and/or evacuation and instrumental activity of purchasing (34), while another Brazilian study found that the dressing represents the highest percentage of dependency among BADLs and Telephone use represent the largest percentage of dependency among IADLs (18). The commonest dependent activities in a study in Kurdistan-Iraq included shopping, food preparation, responsibility for own medications, climbing stairs, physical ambulation, bathing, and toileting (17), and the most affected function was transferring followed by continence, dressing, and bathing in Riyadh City (19). More complex activities are affected by individual habits that contribute to the maintenance of their functional capacity and make greater demands on cognitive skills. A study done in India found the highest percentage of dependency for IADLs in Telephone use and financial management (32). The same result regarded shopping, housekeeping, laundry, preparing food, and transportation in a study done in Jordan (35). Continence" was the activity of higher dependence than bathing among BADLs and IADLs assessed with the Lawton index with variable gender, the greatest differences are found in the activities related to money administration, responsibility in drug intakes, and use of means of transport, in these activities, men are less dependent than women. On other hand, women are more independent than men in activities such as doing the laundry, housekeeping, and cooking (36), in general, these differences may be due to the presence of chronic diseases of the musculoskeletal system like osteoporosis or vision and hearing impairment, advanced functional capacity may decline, considering that the capacity for carrying out a task requires the combination of different physiological systems and other factors like the late entry of phone use in the life of individuals over 60 years of age and most of them can't use it properly, some women had never had paid employment, depend on their husbands to manage the finances and were more responsible for household activities.

## Conclusions

1. The total prevalence of functional disability in the elderly sample for BADLs and IADLs was 4.5% and 10.8% respectively.
2. Incontinence represents the highest percentage of dependency among BADLs followed by bathing, while food preparation, shopping, and responsibility for own medications represent the highest percentage of dependency among IADLs in the elderly sample.
3. There was a significant association between functional disability with age, gender, and marital status in BADLs performance.
4. There was a significant association between functional disability with age, gender, educational level, and occupation in IADLs performance.

## Abbreviations

Not applicable

## Declarations

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