Research Article

# Depression, anxiety, and stress among some elderly caregivers in Alexandria city, Egypt

**Noha Shawky Ali Moustafa[1], Mona Shawki Ali Moustafa[2]**

[1]Lecturer of Primary Health Care, High Institute of Public Health, Alexandria University, Alexandria, Egypt, [2]Department of Industrial Medicine and Occupational Health, Faculty of Medicine, Alexandria University, Alexandria, Egypt

**Correspondence to:** Noha Shawky Moustafa, E-mail: noha_shawky14@yahoo.com

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## ABSTRACT

**Background:** Caregiving is extremely stressful task. Thus, Caregivers are sometimes at greater health risk than the care receivers, tend to develop negative health behaviors, and suffer from physical and psychological disorders. **Objective:** The objective of the study was to assess depression, anxiety, and stress among elderly caregivers in Alexandria and to compare psychological impact on formal against informal elderly caregivers. **Materials and Methods:** A comparative cross-sectional survey was conducted among 276 formal caregivers working at 12 elders' care institutions and 183 randomly selected informal elderly caregivers in Alexandria governorate, Egypt. An interview anonymous questionnaire was utilized to collect data from caregivers about personal characteristics, occupational history, and psychological condition using Depression Anxiety Stress Scale (DASS) to detect depression, anxiety, and stress among them. **Results:** The results revealed that higher percentage of the studied formal caregivers experienced depression (45.7%) and anxiety (46.7%) as compared to the informal group (33.9% for both). Meanwhile, the majority of the informal caregivers (75.4%) suffered from stress compared to 48.9% of the formal caregivers, ($P < 0.0001$). Totally, the informal group experienced higher levels of psychological burden ($P = 0.029$). Receiving unsatisfactory income and serving elders suffering from Alzheimer and/or dementia were the predictors for a higher DASS score among formal caregivers. Meanwhile, the predictors among the informal caregivers were being a female of younger age and caring for a higher number of elders. **Conclusion:** The study revealed that caregiving has a negative psychological impact on both formal and informal caregivers with statistically significantly higher level on informal ones.

**KEY WORDS:** Caregivers; Elders; Psychological Impact; Depression Anxiety Stress Scale; Egypt

## INTRODUCTION

In most countries, the proportion of people aged over 60 years is growing faster than any other age group, as a result of both longer life expectancy and declining fertility rates. In Egypt, the Central Agency for Public Mobilization and Statistics reported in 2013 that citizens aged 65 years and older represented 7.8% of the population and expected to increase to 10% by the year 2020.[1]

The Egyptian Government supports the establishment of older people homes whose number was 37 in the year 1982 and increased to 80 by the year 2000 which were distributed all over the country mainly in the big cities. All the homes are under the supervision of the Ministry of Social Solidarity according to legislation issued in 1997 which specifies the standards of such homes and ensures the standards of the elderly homes. Despite such legislation, there are no minimal training requirements for the staff or agreed resident to staff ratio.[2]

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"Caregiver" is defined as an individual responsible for caring for a sick or dependent individual, who helps this individual to perform daily tasks such as eating and personal hygiene, in addition to administering routine medication and accompanying the individual to health care services or other services, necessary in their daily routine, excluding techniques or procedures identified as being exclusive to other legally established professions.[3,4]

Formal caregivers are volunteers or paid employees connected to the social service or health-care system while the term informal caregivers refer to family members and friends who provide nearly three-quarters of the care currently being provided to impaired older adults living in the community.[5]

Caregiving is extremely stressful task.[6] Providing care to someone especially the elderly whether fulltime or part time, formal or informal takes a huge toll, both physically and emotionally.[7] Thus, caregivers are sometimes at a greater health risk than the care receivers because when the caregivers devote themselves to the needs of someone else, they tend to neglect their own needs. They may even not recognize or ignore signs of illness, exhaustion, or depression they experience.[8]

Moreover, several studies have shown that family caregivers, especially for dementing elderly, tend to develop negative health behaviors such as smoking, overeating, and not exercising. They frequently suffer from physical and psychological disorders, exhibit maladaptive coping strategies, and even may neglect taking care of themselves which results to high mortality rates.[9-12]

The aim of the research was to assess depression, anxiety, and stress among elderly caregivers in Alexandria. Moreover, the study aimed to compare psychological impact on formal against informal elderly caregivers.

## MATERIALS AND METHODS

A comparative cross-sectional descriptive study was conducted from December 2016 to July 2017 targeting formal and informal elders' caregivers in Alexandria city, Egypt. A total number of 276 formal caregivers were interviewed in 12 elders-care private and public institutions located in randomly selected four districts in Alexandria (East, West, Middle, and El-Montazah district) out of eight districts. The 12 institutions were the only permitted to be enrolled in the research in the selected districts by Ministry of Solidarity. The target population included was all available, willing to participate, employed for more than 1 year, and do not offer additional informal caregiving services.

Informal caregivers were all the available workers and administrative employees in the Faculty of Medicine and the High Institute of Public Health (HIPH) – Alexandria University, who were informally caregiving elders aged 65 years or older of either gender for at least 1-year duration. The informal caregivers enrolled in the study were 183 caregivers.

The field work to collect data of the research was conducted from August 1, 2017 to end of January 2018.

A pre-designed interview questionnaire was developed in Arabic to collect the needed data after reviewing literature. The questionnaire included three parts:

- Sociodemographic and occupational characteristics of the studied caregivers.
- Characteristics of elders cared for by the studied caregivers.
- The Depression Anxiety Stress Scale (DASS) questionnaire: DASS is widely used screening tool to assess symptoms of depression, anxiety, and stress in community settings. The Arabic version of DASS was used to collect data.[13]

DASS scale comprises three subscales: The depression subscale which measures hopelessness, low self-esteem, and low positive affect; the anxiety scale which assesses autonomic arousal, muscle-skeletal symptoms, situational anxiety, and subjective experience of anxious arousal; and the stress scale which assesses tension, agitation, and negative effect.

The DASS scale consists of 42 items, with 14 items in each scale measuring the respective current symptoms of depression, anxiety, and stress. The DASS uses a four-point scale to rate the severity, which ranges from 0 ("not apply to me at all") to 3 ("applied to me very much, or most of the time").

To obtain the total score and the scores for depression, anxiety, and stress, the individual score from the respective items was added up, as recommended by Lovibond and Lovibond, who developed the tool. The range of the score of each area is from 0 to 42.[14]

### Validity of the Questionnaire

The questionnaire was prepared based on the available literatures. It was revised by a panel of reviewers in the field of psychiatry and community medicine for appropriateness and the ability to collect the needed data.

For the purpose of determining the appropriateness of the questionnaire, a pilot study was conducted on 30 randomly selected caregivers; 15 of each group, who were excluded from the main study, resulting in rephrasing some questions in the finally used tool.

Cronbach's alpha was used to test the reliability of the DASS using the pilot study data. The Cronbach's alpha coefficient was found to be 0.79.

### Statistics

Raw data were coded, entered, and analyzed using SPSS system files (SPSS package version 20). Data were described using frequency; distribution, mean, median, standard deviation, and interquartile range (IQR). Normality of data distribution was tested using Kolmogorov–Smirnov test. Univariate analyses were conducted using Student's *t*-test and Mann–Whitney test for quantitative variables and Chi-square test for qualitative variables. Linear correlation between DASS score and different parameters among the studied formal and informal caregivers was conducted using Spearman's Rho correlation coefficient. Multivariate analysis using linear regression was conducted to delineate predictors of psychological burden as assessed by DASS score among both groups of caregivers. The significance of the results was at the 5% level of significance.

### Ethical Considerations

The research protocol was approved by Alexandria Faculty of Medicine Research Committee, so as the Committee of Research Ethics affiliated to Alexandria Main University Hospital and Research Committee in HIPH. An Informed written consent was obtained from all participants before participation in the study. Objectives of the study were clarified to the respondents and participants' privacy was guaranteed.

## RESULTS

The majority of formal and informal caregivers were females (89.1% and 91.8%, respectively) with no significant difference between both groups. Both groups showed no statistically significant difference regarding their age, marital status, educational level, or suffering chronic illnesses. The duration of informal caregiving ranged from 1.0 to 7.0 years with a median of 1.8 years (IQR: 1.0–3.0 years). Two-thirds of the informal caregivers were daughters (66.1%). Smaller percentages were daughters in law (17.5%), wives (8.2%), or sons (8.2%) [Table 1].

Studying the occupational characteristics of the studied formal caregivers [Table 2] revealed that they worked as workers (42.2%), supervisors (21.7%), elderly sitters (18.5%), or social workers (7.6%). The duration of their employment ranged between 1 and 34 years with median of 5 years (IQR: 2–10 years). The majority of formal caregivers had previous jobs others than caregiving (90.2%) and had no extra job (97.8%). More than half of them (59.8%) also were satisfied by their income.

The majority of formal caregivers worked during daytime (82.6%) for 8 h or less daily (77.2%) for 6 days a week (91.3%). Only about a third of the formal caregivers (32.6%) reported receiving training on dealing with elders suffering from Alzheimer or dementia. The trained workers had received their training since a duration ranged between 0.25 and 11.0 years with a median 1.5 years (IQR: 1.0–3.0 years). A number of elders served by a formal caregiver ranged between 1 and 40 elders with a median of 12 elders (IQR: 6–20) [Table 2].

Two-thirds of formal caregivers cared for elders of both gender (66.3%) compared to 17.5% among informal caregivers, respectively ($P < 0.0001$). Furthermore, the majority of formal caregivers reported that they care for elders suffering from physical disability (88.1%) and/or dementing disorders including Alzheimer (84.8%) – which was the main reason for elders' families to admit their elders to an elderly care home – compared to 41.5% and none among elders cared for by informal caregivers, respectively ($P < 0.0001$) [Table 3].

The social relation with work colleagues, work supervisors, and cared for elders was generally good as reported by nearly all caregivers of both groups with no significant differences observed [Table 4].

Psychological well-being of caregivers was assessed using DASS scale [Table 5]. Both formal and informal caregivers experienced depression, anxiety, and stress to some extent. Significantly higher percentage of the studied formal caregivers experienced depression and anxiety (45.7% and 46.7%, respectively) as compared to the informal group (33.9% for both). Meanwhile, the majority of the informal caregivers (75.4%) suffered from stress compared to 48.9% of the formal caregivers ($P < 0.0001$). By applying total DASS score, the informal group experienced higher levels of psychological burden ($P = 0.029$).

Among the formal caregivers, DASS score was positively correlated with having an extra job ($P = 0.014$) and receiving unsatisfactory monthly income ($P = 0.001$). Moreover, the score was positively correlated with more number of work days weekly ($P = 0.034$), suffering Alzheimer and/or dementia among elders they cared for ($P < 0.0001$). Meanwhile, DASS score was negatively correlated with the employment duration in caregiving denoting higher affection in recent caregivers rather than experienced ones ($P = 0.035$).On the other hand, DASS score among the informal caregivers was positively correlated with being a female ($P < 0.0001$), of younger age ($P < 0.0001$), caring for higher number of elders ($P < 0.0001$), and for longer duration of caregiving ($P = 0.045$) [Table 6].

Predictors for DASS score among formal caregivers were tested using linear regression [Table 7] where receiving unsatisfactory income ($P = 0.006$) and serving elders suffering from Alzheimer and/or dementia ($P = 0.002$)

**Table 1:** Socio-demographic characteristics of the studied formal and informal caregivers

| Sociodemographic characteristics | Formal caregivers *n*=276 (%) | Informal caregivers *n*=183 (%) | Significance |
|---|---|---|---|
| Gender | | | |
| Male | 30 (10.9) | 15 (8.2) | $\chi 2$=0.889 |
| Female | 246 (89.1) | 168 (91.8) | *P*=0.346 |
| Age (years) | | | |
| <20 | 6 (2.2) | 0 (0.0) | |
| 20–<30 | 53 (19.3) | 15 (8.2) | |
| 30–<40 | 81 (29.3) | 85 (46.4) | |
| 40–<50 | 85 (30.8) | 31 (16.9) | |
| 50–<60 | 39 (14.1) | 52 (28.4) | |
| 60–<70 | 12 (4.3) | 0 (0.0) | |
| Min-Max | 19.0–65.0 | 25.0–58.0 | *t*=1.738 |
| Mean±SD | 38.9±11.1 | 40.7±10.5 | *P*=0.083 |
| Marital status | | | |
| Single | 33 (11.9) | 15 (8.1) | |
| Married | 207 (75.0) | 150 (82.0) | $\chi 2$=3.140 |
| Divorced/widow | 36 (13.1) | 18 (9.9) | *P*=0.208 |
| Educational level | | | |
| Illiterate/read and write | 66 (23.9) | 34 (18.6) | |
| Basic education | 69 (25.0) | 35 (19.1) | $\chi 2$=6.320 |
| Secondary/technical education | 63 (22.8) | 45 (24.6) | *P*=0.097 |
| University graduate | 78 (28.3) | 69 (37.7) | |
| Duration of informal elders caregiving (years) | [*n*=0] | [*n*=183] | |
| 1–<5 | - | 156 (85.2) | |
| 5–<10 | - | 27 (14.8) | |
| Min-Max | - | 1.0–7.0 | -NA- |
| Median (Q1-Q3) | - | 1.8 (1.0–3.0) | |
| Suffering from chronic diseases | | | |
| No | 250 (90.6) | 171 (93.4) | $\chi 2$=1.190 |
| Yes | 26 (9.4) | 12 (6.6) | *P*=0.276 |
| Relation to care recipient | | | |
| Daughter | - | 121 (66.1) | |
| Son | - | 15 (8.2) | -NA- |
| Daughter in law | - | 32 (17.5) | |
| Wife | - | 15 (8.2) | |

$\chi 2$: Chi-square test *t:* Student *t*-test Q1-Q3: Interquartile range -NA-: Not applicable. SD: Standard deviation

were the predictors for a higher DASS score. Meanwhile, the predictors among the informal caregivers were being a female ($P < 0.0001$) of younger age ($P < 0.0001$) and caring for a higher number of elders ($P < 0.0001$).

## DISCUSSION

The study revealed that elders caregiving in Alexandria is a task nearly done by females either as formal or informal task (89.1% and 91.8%, respectively). Although such finding is consistent with studies conducted in various countries with different cultural background,[15-19] still, the current research showed much higher percentage of female caregivers than that reported by earlier studies which ranged between 65% in the American studies among informal caregivers (2015)[20] and 75% in Italy (2014).[21] Moreover, the female percentage among caregivers increased in the Egyptian community as previous studies reported a female percentage of 87.5% among informal caregivers.[15,22] Such observation could be attributed to the trend of increased informal caregiving on the expense of formal caregiving due to the economic burden experienced by Egyptian families.

Another finding was that average age of the informal caregivers (40.7 ± 10.5 years) was much lower than the average age of informal caregivers in the USA (49.2 years) as

**Table 2:** Occupational characteristics of the studied formal caregivers

| Occupational characteristics | Formal caregivers *n*=276 (%) |
|---|---|
| Job | |
| Social worker | 21 (7.6) |
| Supervisor | 60 (21.7) |
| Elderly sitter | 51 (18.5) |
| Worker | 144 (42.2) |
| Duration of employment (years) | |
| 1–<10 | 198 (71.7) |
| 10–<20 | 66 (23.9) |
| 20–<30 | 9 (3.3) |
| 30–<40 | 3 (1.1) |
| Min-Max | 1.0–34.0 |
| Median (Q1-Q3) | 5.0 (2.0–10.0) |
| Previous job | |
| Similar job | 27 (9.8) |
| Other jobs | 249 (90.2) |
| Extra job | |
| No | 270 (97.8) |
| Yes | 6 (2.2) |
| Monthly income | |
| Satisfactory | 165 (59.8) |
| Unsatisfactory | 111 (40.2) |
| Timing of work shift | |
| Day | 228 (82.6) |
| Night | 12 (4.3) |
| Rotating | 36 (13.0) |
| Duration of daily work (hours) | |
| 8 h or less | 213 (77.2) |
| More than 8 h | 63 (22.8) |
| Min-Max | 6.0–16.0 |
| Median (Q1-Q3) | 7.0 (7.0–8.0) |
| Number of days worked per week | |
| 6 days | 252 (91.3) |
| 7 days | 24 (8.7) |
| Received training on dealing with elders with Alzheimer/ dementia | |
| Yes | 90 (32.6) |
| No | 186 (67.4) |
| Duration of last training (years) [*n*=90] | |
| <1 | 3 (3.3) |
| 1–<5 | 78 (86.7) |
| 5–<10 | 6 (6.7) |
| 10–<15 | 3 (3.3) |
| Min-Max | 0.25–11.0 |
| Median (Q1-Q3) | 1.5 (1.0–3.0) |
| #Number of cared for elders | |
| <10 | 102 (37.0) |
| 10–<20 | 99 (35.9) |
| 20–<30 | 42 (15.2) |
| 30–≤40 | 33 (12.0) |
| Min-Max | 1–40 |
| Median (Q1-Q3) | 12 (6–20) |

Q1-Q3: Interquartile range #informal caregivers served one elder (83.6) or two elders at maximum (16.4%)

reported in 2016.[23] Such observation denotes much burden added to the young working force in the Egyptian community thus higher economic burden.

Despite the fact that the elders' caregiving institutes had set-specific acceptance criteria including that elders admitted should be free from Alzheimer and dementing disorders, still the majority of the studied formal caregivers reported that they care for elders suffering from these mental disorders (84.8%). Furthermore, only 67.4% of the formal caregivers received training on dealing with such medical condition denoting that providing a comprehensive training for the formal caregivers on how to deal with elders with mental disability should be set as a priority by the decision-making personnel. Moreover, thorough medical assessment of elders on admission to caregiving institutes should be emphasized using professional medical team.

Severe deficiency was observed in the number of formal caregivers in the studied institutes where the studied caregivers cared for up to 40 elders in some institutes. Worldwide, no known minimum staffing number for elders' caregiving institutes. Instead, duration of service delivery to each elder is the most important parameter to be encountered in day-to-day care to maintain the highest possible level of physical, mental, and psychosocial well-being of elders. Duration needed to serve each elder as set by the federal law in the USA is 3 h daily, 3 h of assistant time, and 1 h of licensed nurse.[23] Such figures are definitely far from the observed ones in the current study.

The psychological burden encountered among the studied formal and informal caregivers was assessed using DASS where the informal caregivers suffered significantly from higher levels of stress and the formal ones suffered higher levels of depression and anxiety. Collectively, the burden

**Table 3:** Characteristics of elders cared for by the studied formal and informal caregivers

| Characteristics of care receivers | Formal caregivers *n*=276 (%) | Informal caregivers *n*=183 (%) | Significance |
|---|---|---|---|
| Gender of care receivers | | | |
| Male | 15 (5.4) | 18 (9.8) | |
| Female | 78 (28.3) | 133 (72.7) | $\chi 2$=106.180 |
| Both | 183 (66.3) | 32 (17.5) | *P*<0.0001* |
| Caring for elders suffering from physical disability | | | |
| No | 33 (11.9) | 107 (58.5) | $\chi 2$=122.930 |
| Yes | 264 (88.1) | 76 (41.5) | *P*<0.0001* |
| Caring for elders suffering from Alzheimer or dementing disorders | | | |
| No | 42 (15.2) | 183 (100.0) | $\chi 2$=316.510 |
| Yes | 234 (84.8) | 0 (0.0) | *P*<0.0001* |

$\chi 2$: Chi-square test

**Table 4:** Social relations of the studied formal and informal caregivers

| Social relations | Formal caregivers *n*=276 (%) | Informal caregivers *n*=183 (%) | Significance |
|---|---|---|---|
| Social relations with colleagues at work | | (*n*=94)# | |
| Good | 267 (96.7) | 85 (90.4) | $\chi 2$=3.39 |
| Fair | 6 (2.2) | 9 (9.6) | $^{MC}P$=0.184 |
| Poor | 3 (1.1) | 0 (0.0) | |
| Social relations with supervisors | | (*n*=94)# | |
| Good | 264 (95.7) | 90 (95.7) | $^{FE}P$=1.0 |
| Fair | 12 (4.3) | 4 (4.3) | |
| Social relations with elders | | | |
| Good | 264 (95.7) | 178 (97.3) | $\chi 2$=0.810 |
| Fair | 12 (4.3) | 5 (2.7) | *P*=0.369 |

#Applicable on working informal caregivers [*n*=94]. $\chi 2$: Chi-square test $^{MC}P$: Monte Carlo corrected *P* value $^{FE}P$: Fisher's exact test

encountered by the informal group was significantly higher than that observed among the formal group. Takahashi carried out a cross-sectional study to examine the differences in depressive state and associated factors between informal and professional caregivers; he found that the informal caregivers feet a higher care burden, experience lower quality of life, and more frequent depression.[24]

A considerable proportion of the currently studied caregivers experienced psychological burden, where formal and informal caregivers had depression (45.7% and 33.9%, respectively), anxiety (46.7% and 33.9%, respectively), and stress (48.9% and 75.9%, respectively). Studies show that between 40 and 70% of caregivers have clinically significant symptoms of depression,[25-28] with approximately one-quarter to one-half of those caregivers meeting the diagnostic criteria for major depression.[29] Moreover, caregivers have higher levels of stress than non-caregivers.[26] They also describe feeling frustrated, angry, drained, guilty, or helpless as a result of providing care.[30]

In agreement with our results, earlier studies showed that burden encountered among formal caregivers was correlated to the severity of behavioral and psychological symptoms of dementia the elders suffered.[31-33] Hence, to decrease the burden on formal caregivers, dementia should be properly controlled, so more need for medical care offered to such elders is needed. In addition, in our study, DASS score increased significantly among formal caregivers in relation to unsatisfactory monthly income, which is generally reported in literature.[34-37]

Among the informal caregivers, burden was affected primarily by the duration spent daily in caregiving. This is consistent with findings of Serrano-Aguilar *et al.* that lower levels of caregiver well-being on both physical and psychological measures were associated with a greater number of hours spent providing caregiving.[10] To reduce this effect, the Japanese study (2016) reported that social support by family members is highly needed to decrease burden on the informal caregivers.[38]

Burden among informal caregivers was strongly negatively correlated with the age of caregivers where younger caregivers experienced higher burden. This finding agrees with the results of an earlier study[39] which could be explained by lack of experience and being involved in too much tasks at such age.

Another finding was that female informal caregivers experienced evidently higher psychological burden than

**Table 5:** Scores of DASS scale among the studied formal and informal caregivers

| DASS scale | Formal caregivers *n*=276 (%) | | Informal caregivers *n*=183 (%) | | Significance |
|---|---|---|---|---|---|
| Depression score | | | | | |
| Normal | 150 | 54.3 | 121 | 66.1 | $\chi 2$=6.310 |
| Experience depression | 126 | 45.7 | 62 | 33.9 | *P*=0.012* |
| Mild | 27 | 9.8 | 15 | 8.2 | |
| Moderate | 36 | 13.0 | 0 | 0.0 | $\chi 2$=22.590 |
| Severe/extremely severe | 63 | 22.8 | 47 | 25.7 | *P*<0.0001* |
| Anxiety score | | | | | |
| Normal | 147 | 53.3 | 121 | 66.1 | $\chi 2$=7.490 |
| Experience anxiety | 129 | 46.7 | 62 | 33.9 | *P*=0.006* |
| Mild | 48 | 17.4 | 30 | 16.4 | |
| Moderate | 30 | 1.9 | 32 | 17.5 | $\chi 2$=36.170 |
| Severe/extremely severe | 51 | 18.4 | 0 | 0.0 | *P*<0.0001* |
| Stress score | | | | | |
| Normal | 141 | 51.1 | 45 | 24.6 | χ2=32.050 |
| Experience stress | 135 | 48.9 | 138 | 75.4 | *P*<0.0001* |
| Mild | 54 | 19.6 | 77 | 42.1 | |
| Moderate | 51 | 18.5 | 30 | 16.4 | $\chi 2$=9.470 |
| Severe/extremely severe | 30 | 10.9 | 31 | 16.9 | *P*=0.009* |
| Total DASS score | | | | | |
| Min-Max | 0–96 | | 17–78 | | *Z*=2.187 |
| Median (Q1-Q3) | 30 (16–46.8) | | 36 (21–61) | | *P*=0.029* |

Q1-Q3: Interquartile range Z: Mann–Whitney test. DASS: Depression Anxiety Stress Scale

**Table 6:** Correlation between total DASS score and different parameters among the studied formal and informal caregivers

| Variables | DASS score | | | |
|---|---|---|---|---|
| | Formal caregivers (*n*=276) | | Informal caregivers (*n*=183) | |
| | r | *P* | r | *P* |
| Sociodemographic characteristics | | | | |
| Gender (male/female) | 0.106 | 0.079 | 0.477 | <0.0001* |
| Age (years) | −0.090 | 0.135 | −0.319 | <0.0001* |
| Marital status (not married/married) | −0.115 | 0.057 | 0.019 | 0.795 |
| Educational level (less than university/university) | −0.022 | 0.714 | −0.049 | 0.507 |
| Occupational characteristics | | | | |
| Duration of employment (years) | 0.029 | 0.629 | - | - |
| Previous job (similar/others) | 0.074 | 0.218 | - | - |
| Extra-job (no/yes) | 0.147 | 0.014* | - | - |
| Monthly income (satisfactory/unsatisfactory) | 0.199 | 0.001* | - | - |
| Duration of daily work (hours) | −0.045 | 0.460 | - | - |
| Number of days worked per week | 0.128 | 0.034* | - | - |
| Received training on dealing with elders with Alzheimer | −0.018 | 0.762 | - | - |
| Duration of last training (years) [*n*=90] | 0.160 | 0.131 | - | - |
| Duration of formal caregiving (years) | −0.126 | 0.035* | - | - |
| Characteristics of care receivers | | | | |
| Number of elders cared for | −0.096 | 0.111 | 0.265 | <0.0001* |
| Care receivers suffer from physical disability (no/yes) | 0.084 | 0.165 | −0.086 | 0.250 |

*(Contd...)*

**Table 6:** *(Continued)*

| Variables | DASS score | | | |
|---|---|---|---|---|
| | Formal caregivers (*n*=276) | | Informal caregivers (*n*=183) | |
| | r | *P* | r | *P* |
| Care receivers suffer from Alzheimer/dementia disorders (no/yes) | 0.248 | <0.0001* | - | - |
| Duration of informal caregiving (years) | - | - | 0.152 | 0.045* |

r: Spearman Rho correlation coefficient. DASS: Depression Anxiety Stress Scale

**Table 7:** Predictors of DASS score among caregivers using linear regression (enter method)

| Characteristics | Formal caregivers[1] | | | Informal caregivers[2] | | |
|---|---|---|---|---|---|---|
| | Beta | *t* | *P* | Beta | *t* | *P* |
| Sociodemographic characteristics | | | | | | |
| Age (years) | - | - | - | −0.731 | 15.101 | <0.0001* |
| Gender (male/female) | - | - | - | 0.499 | 10.997 | <0.0001* |
| Informal caregiving (no/yes) | - | - | - | 0.038 | 0.431 | 0.849 |
| Occupational characteristics | | | | | | |
| Extra-job (no/yes) | −0.104 | 1.779 | 0.076 | - | - | - |
| Monthly income (satisfactory/unsatisfactory) | 0.175 | 2.798 | 0.006* | - | - | - |
| Number of days worked per week | 0.065 | 1.114 | 0.266 | - | - | - |
| Duration of formal caregiving (years) | −0.040 | 0650 | 0.517 | - | - | - |
| Characteristics of care receivers | | | | | | |
| Number of care receivers | - | - | - | 0.610 | 12.599 | <0.0001* |
| Care receivers suffer from Alzheimer (no/yes) | 0.138 | 3.074 | 0.002* | - | - | - |

[1]Regression model for DASS score for formal caregivers: F=5.397, *P*<0.0001, adjusted $R^2$=0.074. [2]Regression model for DASS score for informal: F=111.441, *P*<0.0001, adjusted $R^2$=0.645. DASS: Depression Anxiety Stress Scale

males due to the emotional affection on females. Such result was consistent with the results found by Gallicchio *et al.*[40] and Croog *et al.*[41] Research shows that female caregivers report higher levels of depressive and anxiety symptoms and lower levels of subjective well-being, life satisfaction, and physical health than male caregivers.[42,43]

The current study has strength points including the diversity of the variables studied in both formal and informal caregivers and the large sample included representing wide range of elders' care institutions in Alexandria.

However, some limitations were encountered during the implementation of the study, namely, the inaccessibility to some of the elders' care institutions due to refusal of their managers to participate in the study which erase doubts about the quality of the service delivered there. Moreover, conducting a cross-sectional study was an obstacle to prove the causal relationship. Furthermore, lack of elders suffering from dementing disorders or Alzheimer cared for by the informal caregivers did not allow comparing such factor among the studied groups.

## CONCLUSION

The study revealed that caregiving has a negative psychological impact on both formal and informal caregivers with significantly higher effect on informal ones. Thus, we may recommend the increase in the number of elderly care homes nationally. Legislations should include terms about staff-resident ratio and training of caregivers with special emphasize on stress-coping strategies. Moreover, informal caregivers should have the opportunity to join social support groups to alleviate their stress. Finally, further research is needed to study the impact of offering simultaneous formal and informal caregiving on health and well-being.

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