Structural Equation Model of affecting factors on elder abuse to patients under hemodialysis by family caregivers

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Abstract

Background

The aim of the present study was to determine the factors affecting the abuse of the elderly by family caregivers among the elderly with hemodialysis (HD) using structural equation modeling.

Method

The study is descriptive-cross sectional, which is conducted in 2018 in Iran. The sample size was 367 in both groups (the elderly and their family caregivers). Data collection was done using an individual-social information questionnaire for the older adults under hemodialysis and their family caregivers, the questionnaire of elder abuse by family caregivers to the older people under hemodialysis, Zarit Burden Interview and the scale of instrumental activities of Daily Living (IADL).

Data were analyzed by the SEM method. The Fitness of proposed pattern was measured using the following indexes: Chi-squared degree of freedom ratio (CMIN/DF), Parsimonious Normed Fit Index (PNFI), Comparative Fit Index (CFI), Parsimonious Comparative Fit Index (PCFI), Incremental fit index (IFI), Goodness of Fit Index (GFI) and Root Mean Square Error of Approximation (RMSEA). The significant level in this study was considered $p < 0.05$.

Results

The results of the present study showed that more than 70% of the elderly suffer from elder abuse by family caregivers on average. The highest median elder abuse was related to emotional misbehavior (21.46 ± 6.09) and financial misbehavior (19.07 ± 5.33), respectively. 63.2% of caregivers have experienced moderate care burden. 81.4% of women and 80.5% of older men needed help with daily activities. The results showed that the caregivers' level of education and care burden with standard beta coefficient of -0.251 and 0.200 and the level of elderly's education and IADL with the best beta coefficient of -0.299 and -0.234, had the highest regression effect on elder abuse respectively. According to the results, the model-fit indices of the hypothesized model was meet the criteria, with the PNFI= 0.746, PCFI= 0.796, IFI= 0.963, GFI=0.970, CFI=0.967, and RMSEA= 0.075. The outcome was suitable for the recommended level, so the hypothetical model appeared to fit the data.

Conclusion

Providing psychological interventions for family caregivers can reduce the burden when the elderly suffers from other chronic illnesses.

Background

This is a cross-sectional study conducted in 2018 in Iran.

Sample

The study population was all the older people under hemodialysis who referred to medical centers in the western cities of Mazandaran province and the eastern part of Gilan province and their family caregivers. Convenience sampling was applied and the number of samples was determined using the following formula.

$$n = \frac{2(Z_{1-\frac{\alpha}{2}} + Z_{1-\beta})^2 s^2}{d^2}$$

Where is the needed sample size, $s=24.5$ and $d=0.2$. The needed sample size was estimated to be 341 participants by accepting $\alpha=0.05$, $Z_{1-\frac{\alpha}{2}}=1.96$, 80% of sample power and $Z_{1-\beta} = 0.84$. Taking into account the 10 percent probability of sample loss, the number of samples in both groups of hemodialysis elderly and their family caregivers was considered to be 370 people.

Inclusion criteria

For elderly people: being 60 and older, history of hemodialysis for at least one year, not having confirmed mental illness, lack of sensory disturbances such as blindness and deafness and receiving the score of 7 and above at the abbreviated mental test (23).

For caregiver: caring for an older adult under hemodialysis, being the patient's relative, not caring another elderly and not having physical or mental illnesses (self-report).

Exclusion criteria

Unwillingness for cooperation.

Data collection

Data was collected by the following tools. All tools were completed by samples from both groups:

1- Individual-social information questionnaire related to older people under hemodialysis:

Age, sex, marital status, level of education, number of children, occupation, roommate, frequent hospitalization due to chronic illness, having other chronic diseases, duration of hemodialysis, being the head of family, ability of doing personal activities, level of need for daily care, Member of the Hemodialysis Association, Drug Abuse, Financial Sufficiency and type of Medical Insurance.

2- Individual-social information questionnaire related to family caregivers:

Age, sex, marital status, level of education, medical education, being patient's relative, length of care for the elderly, chronic illness, care for another patient, being the source of family income, place of residence, housing status, occupation, number of family members, living with the patient.

3- The questionnaire of Elder Abuse to the patients under hemodialysis by Family Caregivers:

This tool has been designed and psychometrically assessed by Mahmoudian et al. (2018). It has an acceptable internal validity ($\alpha = 0.98$) for measuring the construct of elder abuse by family caregivers. It includes 57 items and 7 subscales including psychological misbehavior (6 items), authority deprivation (7 items), physical misbehaviours (2 items), financial misbehaviours (11 items), being abandoned (4 items), caring neglect (8 items) and emotional misbehavior (19 items). The tool is scored through a 4 point likert scale with the options of never (1), sometimes (2), often (3) and always (4). Scores range between 1 to 228. Receiving the score of 1-75 indicates low severity of abuse, 76-152 average and 153-228 extreme severity of abuse (13).

4- Zarit Burden Interview:

This tool was designed by Zarit et al. (1988). It includes 22 items and three dimensions of role-playing stress, Intra-psychic stress, and Competencies and expectations. Caregiver's responses are assessed through a five point likert scale (never to always) and the scores range between 0-88. Getting a score of 0 to 20 showed little or no care burden, score of 21 to 40 a moderate, and the score of 41 to 88 a severe care burden (24, 25). The validity of this tool was investigated and confirmed by Talebi et al. (2016). Its reliability is also confirmed by Cronbach's alpha coefficient of 0.86 (26).

5-Instrumental Activities of Daily Living (IADL):

This tool was first developed by Lawton & Brody (1969) and includes 8 dimensions of Using of telephone, Shopping, Meal preparation, Housekeeping, Laundry, Mode of transportation, Medication management and Money management for women. Women are scored on all 8 areas of function; historically, for men, the areas of food preparation, housekeeping, laundering are excluded. Independent (no help=2), needs help (with a little help=1) and dependent (cannot do that=0) based on a 3 point likert scale is used for responding to the questions. A summary score ranges from 0 (low function, dependent) to 8 (high function, independent) for women, and 0 through 5 for men.

For women, the score of zero indicates a completely dependent situation, 1 to 15 needs for assistance, and the score of 16 indicates a completely independent situation. For men, the score of zero indicates a completely dependent situation, 1 to 9 needs for assistance, and the score of 10 indicates a completely independent situation. The reliability of this tool was controlled by Soltan mohammadi et al. (2014). The results showed that the scale has an acceptable validity and the intra-class correlation coefficient of the two stages of the test with $r=0.993$ is confirmed (27).

Data Analysis

The data obtained from this study were analyzed using LISREL 8.5, SPSS 18 softwares and SEM method. SEM is a general and very powerful multivariate analysis technique of the multivariate regression family. More precisely, it is a general linear model, which allows the researcher to test a set of regression equations simultaneously and to Examine the relationships between different variables at the same time (28). The fitness of the proposed model with data was measured using the Chi-square/degree of freedom ratio (CMIN/DF), Parsimonious Fit Index (PFI), Comparative Fit Index (CFI), Parsimonious Comparative Fit Index

(PCFI), Incremental Fit Index (IFI), Goodness of Fit Index (GFI), and Root Mean Square Error of Approximation (RMSEA). P-Value less than 0.05 was considered as significant level.

Results

Of the 370 samples in the two groups of older people under hemodialysis and their family caregivers, three were excluded from the study due to their refusal to continue cooperation and ignoring a complete revision of the study's tools. Finally, the data of 367 people in both groups were analyzed. 39% of the total 367 older people under hemodialysis were in the age range of 65 – 60 years. 51.5% of the samples were male and 67% were married. 73.6% of the samples had a history of recurrent hospitalization due to chronic disease (Table 1).

Table 1
Demographic Characteristics of the older people under hemodialysis experiencing different severities of elder abuse by family caregivers (n = 367)

Variable	Subgroup	Number (%)	Severity of elder abuse by family caregivers		
			Low 1–75 Number (%)	Moderate 76–152 Number (%)	Extreme 153–228 Number (%)
Age (years)	60–65	143(39)	37(10.1)	103(28.1)	3(0.8)
	66–70	102(27.8)	26(7.1)	75(20.5)	0(0)
	71–75	65(7.7)	19(5.2)	46(12.6)	0(0)
	76–80	36(9.8)	7(1.9)	29(7.9)	0(0)
	81–85	16(4.4)	5(1.4)	11(3)	0(0)
	85<	5(1.4)	2(0.5)	3(0.8)	0(0)
Sex	Female	178(48.5)	50(13.7)	125(34.2)	3(0.8)
	Male	189(51.5)	46(12.6)	142(38.8)	0(0)
Marital Status	Single	5(1.4)	1(0.3)	4(1.1)	0(0)
	Married	246(67)	47(12.8)	196(53.6)	3(0.8)
	Divorced	11(3)	10(2.7)	1(0.3)	0(0)
	Widow	105(28.6)	38(10.4)	66(18)	0(0)
Level of Education	Illiterate	167(45.5)	19(5.2)	147(40.2)	1(0.3)
	Reading and writing	52(14.2)	14(3.8)	37(10.1)	1(0.3)
	Primary school	46(12.5)	11(3)	35(9.6)	0(0)
	High school	70(19.1)	31(8.5)	38(10.4)	1(0.3)
	University degree	32(8.7)	21(5.7)	10(2.7)	0 (0)
Number of Children	No child	28(7.6)	19(5.2)	9(2.5)	0 (0)
	1–3	92(25.1)	31(8.5)	58(15.8)	2(0.5)
	4–6	175(47.7)	41(11.2)	133(36.3)	1(0.3)
	7–9	61(16.6)	5(1.4)	56(15.3)	0 (0)
	More than 10	11(3)	0(0)	11(3)	0 (0)
Occupation	Unemployed	49(13.4)	2(0.5)	47(12.8)	0 (0)

	Farmer	37(10.1)	9(2.5)	28(7.7)	0 (0)
	Labor	20(5.4)	4(1.1)	16(4.4)	0(0)
	Housewife	105(28.6)	23(6.3)	79(21.6)	3(0.8)
	Employee	12(3.3)	7(1.9)	5(1.4)	0(0)
	Retired	73(19.9)	24(6.6)	48(13.1)	0(0)
	Self-employed	26(7.1)	13(3.6)	13(3.6)	0(0)
	Disabled	45(12.3)	14(3.8)	31(8.5)	0(0)
Roommate	Alone	50(13.6)	24(6.6)	25(6.8)	0(0)
	With spouse	121(33)	41(11.2)	80(21.9)	0(0)
	With children	81(22.1)	24(6.6)	57(15.6)	0(0)
	With spouse and children	111(30.2)	7(1.9)	100(27.3)	3(0.8)
	With others	4(1.1)	0(0)	4(1.1)	0(0)
Frequent hospitalization due to chronic illnesses	Yes	270(73.6)	74(20.2)	192(52.5)	3(0.8)
	No	97(26.4)	22(6)	75(20.5)	0(0)
Type of insurance	Social security	129(35.1)	20(5.5)	107(29.2)	2(0.5)
	Health services	149(40.6)	62(16.9)	86(23.5)	0(0)
	Rural inhabitants insurance	63 (17.2)	13(3.6)	50(13.7)	0(0)
	Others	26(7.1)	1(0.3)	24(6.6)	1(0.3)
Experience of hemodialysis (months)	24>	120(32.8)	15(4.1)	103(28.1)	2(0.5)
	24–48	109(29.5)	42(11.2)	67(18.3)	0(0)
	48<	138(37.7)	40(10.9)	97(26.5)	1(0.3)
Experience of Drug abuse	Yes	44(12)	19(5.2)	25(6.8)	0(0)
	No	323(88)	77(21)	242(66.1)	3(0.8)
Financial Adequacy	Adequate	41(11.2)	20(5.5)	21(5.7)	0(0)
	Average	168(45.8)	44(12)	122(33.3)	1(0.3)
	Low	78(21.3)	13(3.6)	63(17.2)	2(0.5)
	Not adequate	80(21.8)	19(5.2)	61(16.7)	0(0)
Ability of doing personal activities	Completely	15(4.1)	2(0.5)	13(13.6)	0(0)
	A lot	64(17.4)	16(4.4)	46(12.6)	2(0.5)

	Average	145(39.5)	51(13.9)	92(25.1)	1(0.3)
	Low	101(27.5)	23(6.3)	78(21.3)	0(0)
	Not much	42(11.4)	4(1.1)	38(10.4)	0(0)
Need for daily care	Very much	49(13.4)	5(1.4)	44(12)	0(0)
	A lot	115(31.3)	30(8.2)	85(23.2)	0(0)
	Low	121(33)	26(7.1)	93(25.4)	2(0.5)
	Not much	65(17.7)	31(8.5)	32(8.7)	1(0.3)
	Not at all	17(4.6)	4(1.1)	13(3.6)	0(0)
Having other chronic illnesses	Yes	230(62.7)	63(17.2)	166(45.4)	1(0.3)
	No	137(37.3)	33(9)	101(27.6)	2(0.5)
Head of family	Yes	202(55)	56(15.3)	144(39.3)	1(0.3)
	No	165(45)	40(10.9)	123(33.6)	2(0.5)
Membership in hemodialysis association	Yes	297(80.9)	91(24.9)	204(55.7)	1(0.3)
	No	70(19.1)	5(1.4)	63(17.2)	2(0.5)

Table 1. Demographic Characteristics of the older people under hemodialysis experiencing different severities of elder abuse by family caregivers (n = 367)

The results showed that the mean and standard deviation of the age of family caregivers was 13.94 ± 49.85 years with a minimum of 18 and a maximum of 85 years. 64.9% were female caregivers and 79.8% were married (Table 2).

Table 2
Individual characteristics of older adults' caregivers by severity of care burden (n = 367)

Variable	Subgroup	Number (%)	Severity of Care Burden		
			Low	Moderate	Extreme
			0–20	21–40	41–88
			Number (%)	Number (%)	Number (%)
Age (years)	30>	22(6)	13(3.5)	4(1.1)	5(1.4)
	50 – 30	174(47.4)	71(19.3)	70(19.1)	33(9)
	70 – 51	150(40/9)	57(15.5)	60(16.3)	33(9)
	71<	21(5.7)	11(3)	8(2.2)	2(0.5)
Sex	Female	238(64.9)	58(15.8)	44(12)	27(7.4)
	Male	129(35.1)	94(25.6)	98(26.7)	46(12.5)
Marital status	Single	49(13.4)	21(5.7)	18(4.9)	10(2.7)
	Married	293(79.8)	122(33.2)	118(32.2)	53(14.4)
	Divorced	14(3.8)	3(0.8)	5(1.4)	6(1.6)
	Widow	11(3)	6(1.6)	1(0.3)	4(1.1)
Level of Education	Illiterate	81(22.1)	30(8.2)	33(9)	18(4.9)
	Primary School	74(20.2)	31(8.4)	28(7.6)	15(4.1)
	High School	118(32.2)	40(10.9)	46(12.5)	32(8.7)
	University Degree	94(25.6)	51(13.9)	35(9.5)	8(2.2)
Medical Sciences-related Education	Yes	41(11.2)	21(5.7)	14(3.8)	6(1.6)
	No	326(88.8)	131(35.7)	128(34.9)	67(18.3)
Relationship with the Patient	Father	2(5)	1(0.3)	1(0.3)	0(0)
	Mother	10(2.7)	8(2.2)	1(0.3)	1(0.3)
	Spouse	143(39)	59(16.1)	64(17.4)	20(5.4)
	Sister	6(1.6)	3(0.8)	1(0.3)	2(0.5)
	Brother	3(0.8)	3(0.8)	0(0)	0(0)
	Child	166(45.2)	57(15.5)	63(17.2)	46(12.5)
	Others	37(10.1)	21(5.7)	12(3.3)	4(1.1)
Duration of Care (months)	24>	128(34.9)	48(13.1)	58(15.8)	22(6)

	24–48	92(25.1)	18(4.9)	61(16.6)	13(3.5)
	48<	147(40.1)	56(15.3)	73(19.9)	18(4.9)
Caring another Patient?	Yes	29(7.9)	6(1.6)	18(4.9)	5(1.4)
	No	338(92.1)	146(39.8)	124(33.8)	68(18.5)
Having a Chronic disease	Yes	94(25.6)	36(9.8)	33(9)	25(6.8)
	No	273(74.4)	116(31.6)	109(29.7)	48(13.1)
Residence	Urban	222(60)	107(29.2)	72(19.6)	41(11.2)
	Rural	145(40)	44(12)	69(18.8)	30(8.2)
Housing Status	Renting	63(17.2)	22(6)	22(6)	19(5.2)
	Owning	304(82.8)	130(35.4)	120(32.7)	54(14.7)
Occupation	Unemployed	30(8.2)	6(1.6)	15(4.1)	9(2.5)
	Farmer	26(7.1)	10(2.7)	11(3)	5(1.4)
	Housekeeper	145(39.5)	58(15.8)	58(15.8)	29(7.9)
	Labor	21(5.7)	3(0.8)	9(2.5)	9(2.5)
	Employee	36(9.8)	18(4.9)	11(3)	7(1.9)
	Self-Employed	49(13.4)	26(7.1)	15(4.1)	8(2.2)
	Retired	47(12.8)	22(6)	19(5.2)	6(1.6)
	Student	13(3.5)	9(2.5)	4(1.1)	0(0)
Being the family income source	Yes	155(42)	61(16.6)	62(16.9)	29(7.9)
	No	212(58)	87(23.7)	80(21.8)	43(11.7)
Number of family members	< 3	137(37.3)	69(18.8)	49(13.4)	19(5.2)
	4 – 3	163(44.4)	64(17.4)	60(16.3)	39(10.6)
	> 4	67(18.3)	19(5.2)	33(9)	15(4.1)
Living with the patient	Yes	276(75.2)	105(28.6)	114(31.1)	57(15.5)
	No	91(24.9)	47(12.8)	28(7.6)	16(4.4)

Table 2. **Individual characteristics of older adults' caregivers by severity of care burden (n = 367)**

The results showed that the average total score of elder abuse by family caregivers was 19.75 ± 87.89 . The mean total score of abuse severity considering the three levels of low (1–75), moderate (76–152) and extreme (153–228) was 60.53 ± 5.14 , 96.2 ± 9.84 and 169.66 ± 22.30 respectively. The prevalence of elderly abuse by caregivers is presented in Table 3 according to the severity of the abuse. The results showed that the highest prevalence of elder abuse was related to moderate severity (70%).

Table 3
Number and percentage of scores of elder abuse by caregivers and its aspects by the severity of Elder abuse (n = 367)

Elder abuse by caregivers and its aspects	Mean $\pm$ SD	severity of elder abuse by caregivers		
		Low	Moderate	Extreme
		Number (%)	Number (%)	Number (%)
Psychological Misbehavior	10.86 $\pm$ 3.07	71(19.2)	245(66.8)	51(14)
Authority Deprivation	12.70 $\pm$ 3.23	60(16.3)	263(71.7)	44(12)
Physical Misbehavior	3.49 $\pm$ 1.08	103(28.1)	247(67.3)	17(4.6)
Financial Misbehavior	19.07 $\pm$ 5.33	94(25.6)	242(65.9)	31(8.5)
Being Abandoned	7.15 $\pm$ 2.14	91(24.8)	234(63.8)	42(11.4)
Caring Neglect	13.06 $\pm$ 4.40	79(21.5)	262(71.4)	26(7.1)
Emotional Misbehavior	21.46 $\pm$ 6.09	254(69.2)	97(26.4)	16(4.4)
Total	87.89 $\pm$ 19.75	96(26.2)	257(70)	14(3.8)

Table 3. Number and percentage of scores of elder abuse by caregivers and its aspects by the severity of Elder abuse (n = 367)

The results of the present study showed that the mean total score of care burden was 48.63 ± 16.74 . The mean of the total score for the three severity levels of low (0–20), moderate (21–40) and extreme (41–88) were (11.35 ± 5.59), (29.28 ± 5.67) and (53.20 ± 8.61). Also, the highest mean of care burden (22.61 ± 8.75) was related to the role-related stress aspect. 63.2% of caregivers experienced moderate stress (Table 4).

Table 4
Average, standard deviation and frequency distribution of care burden severity and its aspects by levels

Care burden and its aspects	Mean $\pm$ SD	Severity of care burden		
		Low	Moderate	Extreme
		Number (%)	Number (%)	Number (%)
Role Related stress	22.61 $\pm$ 8.75	109(29.7)	226(61.6)	32(8.7)
Intra-Psychic Stress	13.41 $\pm$ 5.86	96(26.2)	221(60.2)	50(13.6)
Competencies & Expectations	12.69 $\pm$ 4.11	101(27.5)	226(61.6)	40(10.9)
Total	48.63 $\pm$ 16.74	94(25.6)	232(63.2)	41(11.2)

Table 4. Average, standard deviation and frequency distribution of care burden severity and its aspects by levels

The results showed that the mean total IADL scores for men and women were 7.68 ± 4.85 and 6.66 ± 3.62 , respectively. The highest mean scores in older men and women were 1.28 ± 0.74 and 1.42 ± 0.66 , respectively, for medication management aspect. 81.4% of women and 80.5% of older men needed help with daily activities (Table 5).

Table 5
Mean, standard deviation and frequency distribution of IADL and its dimensions by sex

IADL	Sex	Mean ± SD	
Using of Telephone	Female	1.19 ± 0.73	
	Male	1.37 ± 0.69	
Shopping	Female	0.89 ± 0.81	
	Male	1.08 ± 0.77	
Meal Preparation	Female	0.96 ± 0.80	
	Male	0	
Housekeeping	Female	0.85 ± 0.72	
	Male	0	
Laundry	Female	0.80 ± 0.81	
	Male	0	
Mode of Transportation	Female	0.96 ± 0.79	
	Male	0.96 ± 0.85	
Medication Management	Female	1.28 ± 0.74	
	Male	1.42 ± 0.66	
Money Management	Female	0.74 ± 0.85	
	Male	1.07 ± 0.80	
Total	Female	Number of completely dependent (0) cases (%)	11(6.2)
		Number of cases needing help (1–15) (%)	145(81.4)
		Completely independent (16) (%)	22(12.4)
		total score	7.68 ± 4.85
	Male	Number of completely dependent (0) cases (%)	9(4.7)
		Number of cases needing help (1–9) (%)	152(80.5)
		Completely independent (10) (%)	28(14.7)
		Total score	6.66 ± 3.62

Table 5. Mean, standard deviation and frequency distribution of IADL and its dimensions by sex

The results of Pearson's correlation test showed that there was a significant negative relationship between IADL with care burden ($r=-0.188$, $P\text{-value} < 0.01$) and elder abuse ($r=-0.113$, $P\text{-value} < 0.05$). There was also a significant positive relationship between care burden and elder abuse ($r = 0.285$, $P\text{-value} < 0.01$). Stepwise method multiple regression was used to investigate the simultaneous effect of variables related to family caregivers and affecting elder abuse. Independent variables (demographic, clinical, and care pressure variables) were entered in model 6. The level of education entered the first model, explaining 27% of the changes in elderly abuse by family caregivers. Also, in models 2 to 6, the variables of care burden, medical sciences-related education, chronic diseases, number of family members and marital status were entered, respectively, and finally explained 43% of changes in the subject. These variables have been also able to make significant predictions for elder abuse by family caregivers. The results showed that the level of education and care burden with the standard beta coefficient of -0.251 and 0.200, respectively, have the highest regression effect on elder abuse by family caregivers (Table 6).

Table 6
The final model (sixth model) of regression of the effect of independent variables (related to family caregivers) on the dependent variable (elder abuse)

Model	Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig
Constant	68.626	9.141		7.508	0.000
Level of education	-4.540	0.927	-0.251	-4.997	0.000
Care burden	0.236	0.058	0.200	4.094	0.000
Medical sciences-related education	8.938	3.128	0.143	2.857	0.005
Having chronic diseases	5.380	2.188	0.119	2.459	0.014
Number of family members	1.796	0.744	0.118	2.415	0.016
Marital status	-3.718	1.786	-0.102	-2.082	0.038

Table 6. The final model (sixth model) of regression of the effect of independent variables (related to family caregivers) on the dependent variable (elder abuse)

Stepwise Method multiple regression was used to investigate the simultaneous effect of variables related to older people under hemodialysis affecting elder abuse by family caregivers. Independent variables (demographic and clinical variables for the elderly and IADL) were entered in 8 models. The level of education entered the first model, explaining 34% of the changes in elder abuse by family caregivers. Also, in models 2 to 8, IADL variables, with whom the older adult lives, ability of doing personal activities, financial adequacy, number of children, having other chronic diseases and age entered the model, which all explained 52% of the changes to the subject. These variables had also the potential to provide significant predictions for elder abuse by caregivers. The results showed that the level of education of the elderly and IADL with the standard

beta coefficient of -0.299 and - 0.234, respectively, had the highest regression effect on the elder abuse (Table 7).

Table 7

The final regression model (8th model) of the effect of independent variables (related to the elderly) on the dependent variable (elder abuse)

Model	Unstandardized Coefficients B	Std.Error	Standardized Coefficients Beta	t	Sig
Constant	66.848	7.817		8.551	0.000
Level of education	-4.160	0.720	-0.299	-5.780	0.000
IADL	-4.283	0.833	-0.234	-5.143	0.000
With whom the older adult lives	8.525	1.806	0.211	4.720	0.000
Ability of doing daily activities	-2.646	0.986	-0.135	-2.683	0.008
Financial adequacy	2.568	0.978	0.124	2.627	0.009
Number of children	3.433	1.088	0.157	3.156	0.002
Having other chronic diseases	4.740	1.901	0.116	2.493	0.013
Age	-1.648	0.786	-0.104	-2.098	0.037

Table 7. The final regression model (8th model) of the effect of independent variables (related to the elderly) on the dependent variable (elder abuse)

In this study, SEM method was used to test the proposed model (Model 1) and the effect of independent demographic and clinical variables of both groups (Fig. 1) on the relationship between care burden and IADL with elder abuse.

The normal distribution of data, outliers and missing data:

To examine the research hypotheses before using the SEM method, the assumptions of this method were examined. For this purpose, single-variable and multi-variable data distribution were examined separately for natural distribution and discarded data. The existence of multivariate scatter data using Mahalanobis d-squared method ($P < 0.001$) and normal multivariate distribution using Mardia coefficient (above 20) were investigated(29). The results showed that the normal single- and multivariate-distribution were normal.

Then, the fitness of the proposed model was evaluated based on the fitness indicators introduced in Table 8. Given that the value of CMIN/DF is less than 5 (30) and the value of RMSEA is less than 0.1(31), the fitness of the proposed model is confirmed. To improve the fitness of the proposed model, the model was modified in the next step by drawing a correlation between the errors.

Table 8
Fit indices of the primary and modified model

	GFI	IFI	PCFI	CFI	PNFI	RMSEA	CMIN/DF	P-Value	Df	χ^2
Primary model	0.841	0.898	0.656	0.897	0.614	0.093	4.42	0.00	134	592.362
Modified model	0.970	0.963	0.796	0.967	0.746	0.075	2.83	0.00	126	357.593
Abbreviations; CFA: Confirmatory Factor Analysis; CMIN/DF: Chi-square/degree-of-freedom ratio; RMSEA: Root Mean Square Error of Approximation; PCFI: Parsimonious Comparative Fit Index; GFI: Goodness of Fit Index; PNFI: Parsimonious Normed Fit Index; IFI: Incremental Fit Index; CFI: Comparative Fit Index. Fit indices: PNFI, PCFI (> 0.5), CFI, IFI, GFI (> 0.9), RMSEA (< 0.05 good, 0.05–0.08 accept, 0.08–0.1 marginal), CMIN/DF (< 3 good, < 5 acceptable).										

Table 8. Fit indices of the primary and modified model

The results showed that the two variables of care burden and IADL explained 43% of the changes in elder abuse by family caregivers in the model. Standard regression coefficients showed that there was a strong negative relationship between IADL and elder abuse by family caregivers. Therefore, the greater the independence of the elderly, the lower the rate of elder abuse abuse ($\beta = 0.12$). There is also a positive and strong relationship between care burden and elderly abuse by family caregivers. As the care burden increases, the abuse increases ($\beta = 0.20$) (Model 1).

Model 1. Standard coefficients of the modified model

The structural function model after data fit with the assumed pattern is shown in Fig. 1 according to the demographic and clinical variables related to the elderly and related to the family caregiver. The results showed that the demographic and clinical variables related to the elderly, with whom the older adult lives ($r = 0.29$, P-value < 0.001), age ($r = 0.14$, P-value < 0.05), other chronic diseases ($r = 0.10$, P-value < 0.05) and the number of children ($r = 0.20$, P-value < 0.001) have a positive effect on the elder abuse respectively. However, the level of education ($r = -0.28$, P-value < 0.001) and financial adequacy ($r = -0.10$, P-value < 0.05) have negative effects. Therefore, the higher the level of education and financial independence of the elderly, the more we will see a decrease in the elder abuse by family caregivers. Also, demographic variables related to family caregiver ($r = -0.19$, P-value < 0.05) and marital status ($r = -0.68$, P-value < 0.001) have a negative effect on the subject, respectively. Therefore, the higher the level of caregiver's education, the lower the rate of elderly abuse. But there is no significant relationship between the number of family members caring for the elderly and the elder abuse.

Figure 1. **Structural Equation Modeling Results: The Relationship between Care burden and IADL with elder abuse by Family Caregivers Based on Demographic and Clinical Variables**

Discussion

The results of the present study showed that more than 70% of elderly suffering from hemodialysis experience moderate elder abuse by family caregivers. Different information is available on the prevalence of elder abuse by family caregivers. For example, in the study of Orfila et al. (2018), the prevalence of the subject

was 33.4%(20) but the same number at the american studies is reported to be 5–10% (32–34). Manouchehri et al.'s (2008) study also found that more than 87% of respondents were at least once abused by family caregivers(35). Such differences can be attributed to different research approaches, target groups, and data collection tools.

The highest median elder abuse was related to the emotional aspect. Negative reactions from family caregivers to the symptoms and consequences of chronic kidney disease or related therapies such as hemodialysis, and expressing disgust as touching the central venous catheter or arterial-venous fistula, or feeling ashamed and therefore not accompanying the elderly in public places due to disease-related appearance changes, and ignoring physical contact with the elderly for fear of contagious disease are among the cases of emotional elder abuse by family caregivers. The high level of emotional abuse can be due to the ignorance of caregivers about how to establish respectful relationships and maintain human dignity with the elderly. The results of other studies showed that the highest score of elder abuse was related to the mental aspect. In Manouchehr et al.'s (2008) research, emotional abuse and negligence have been the most common forms of abuse(35). In Nouri et al.'s (2013) study, 34.8% of the older adults experienced emotional negligence (36).

Financial aspect, with a high average score, was one of the other effective aspects of elder abuse by family caregivers. Financial misconduct covers a wide range of behaviors, such as assigning a portion of assets to a caregiver as somehow paying for care, not having the power to decide on assets, financial exploitation, changing the older adult's will, and seizing an elderly person's property without his or her permission. People do not pay for hemodialysis in Iran but treatment sessions recurring 3–4 times a week each lasting 3–4 hours and other possible chronic illnesses face them with different social- or job-related challenges. Therefore, this group of elderly people loses their financial independence to cover their living expenses or to cure their illness. the need for family caregivers will increase as the person gets older and his or her caring needs expand(16).

In a number of studies, financial misbehaviour has been identified as the most common form of abuse against the older people (37, 38). Although in the results of the study of Heravi Karimi (2008) the samples described financial exploitation as a disrespectful and annoying behavior (39), but some older people have declared the unconditional use of their property by their children acceptable (40). In Iranian culture, the family is expected to support the patient in the absence of financial means. This can put caregivers at greater suffering and pressure. Therefore, it is recommended that dialysis patient support services would be increased in such a way that less financial pressure is imposed on the patient's caregiver. On the other hand, the greater the financial capacity of patients, the greater their access to medical and specialized resources and the better the patient's condition, and ultimately the less suffering of caregivers (41).

The results showed that the level of education of the elderly and IADL had the highest regression effect on elder abuse. This means that with a unit increase in the level of education of the elderly and IADL scores, 0.251 and 0.234 units of decrease are observed in elder abuse, respectively. A high level of education in the elderly may cause them to be able to take better care of themselves and put less pressure on their caregivers. This finding is inconsistent with the results of a study by Orfila et al. (2018) (20). Decreased energy levels, frequent need for hemodialysis and associated health problems, feelings of depression, and inability to perform normal daily activities, all affect the patient and disrupt his normal life and increase his dependence

on family caregivers (26). When the elderly become dependent on family caregivers for a variety of reasons, his self-care and self-management abilities get limited. In fact, time-consuming and tedious activities such as transporting the elderly to dialysis centers, caring for the elderly after dialysis, controlling blood pressure, injecting insulin in cases where the patient has diabetes, controlling the proper and timely use of oral medications, Preparing and supervising the elderly's nutrition and helping him with many of the daily activities of his life, such as bathing, making food, shopping, etc., will be among the duties of family caregivers. In most cases, these tasks and associating them with tasks related to the personal and family life of caregivers imposes a lot of pressure on them, which sometimes leads to misbehavior with the elderly due to lack of social support and support from other family members(26, 42). The results of a study by Dastyar et al. (2020) showed that there is a significant relationship between the need for care and the suffering of care. In a way, the more the patient needs care, the more the caregiver suffers. This suggests that the worse the functional level of patients and the greater their need and dependence on caregivers, the greater the suffering caused by this dependence in caregivers and more possibility of negligence(41).

The results showed that 63.2% of family caregivers experienced moderate care burden. The results of a study by Talebi et al. (2016) also showed that 74.7% of the surveyed caregivers were under extreme care burdens in the areas of personal, social, emotional and economic stress. Of the 154 caregivers in the study, 115 were experiencing extreme care burden, 38 moderate, and only one was handling the situation with low care burden(26). The results of a study by Mollaoğlu et al. (2013) showed that 72.5% of hemodialysis patients experienced moderate to extreme care burden(43). The results of the present study showed that there is a significant relationship between care burden and elder abuse. A study by Iborra et al. (2008) also showed that the negative effects of caring for dependent relatives such as caring burden, stress, mood disorders, social isolation and caregiver's personality are effective factors in elder abuse by family caregivers(44). In this regard, situational theory states that extreme fatigue and the stress of the caregiver create an environment for abuse. This theory points to the problems of caregivers that lead to elder abuse, such as caregiver's addiction, losing job, or other financial problems(45). The results showed that the level of caregiver's education and care burden had the highest regression effect on elder abuse by family caregivers. This means that with one unit increase in the level of caregiver's education, 0.251 units decrease and with one unit increase in the care burden, 0.200 units increase in elder abuse are observed. The results of a study by Dastyar et al. (2020) showed that caregivers who had a higher level of education and were employed reported less care suffering than caregivers with lower education and unemployed(41). The results of a study by Orfila et al. (2018) showed that the most relevant risk factors for elder abuse by family caregivers were the care burden, caregiver's anxiety, caregiver perception of aggressive behavior in the care recipient, and bad previous relationship respectively(20).

The results showed that demographic and clinical variables related to the elderly, such as living alone, being over 70 years old, having other chronic diseases, having more than 3 children, the level of education, and financial adequacy had a negative effect on elder abuse. It seems that as the older adults get older, in addition to developing chronic kidney failure, they may suffer from other chronic diseases, each of which requires its own special care needs. In such cases, the patient is more likely to be hospitalized frequently, especially when the patient lives alone, the vicious cycle of increasing care burden for family caregivers continues and the possibility of elder abuse in various dimensions increases. In such a situation, if the elderly

are financially independent and the care is divided between the children and the burden of care falls on more children, the likelihood of elder abuse is reduced. Also, according to the results of the present study, it can be said that a high level of education may increase the understanding of children's conditions and the acceptance of children's misbehavior. The results Orfila et al. Also showed that there was a significant statistical relationship between the patient's age and elder abuse by family caregiver (20). The results of a study by Skirbekk et al. (2014) showed that the level of education of the elderly was associated with abuse by their family caregivers (46). Based on the results of Rahimi et al. (2016), the large number of family members reduces the likelihood of abuse(10).

The results of the present study showed that the demographic variables related to family caregivers, respectively, the level of caregiver education and marital status, have a negative effect on elder abuse. Therefore, the higher the level of caregiver education, the lower the possibility of abuse. A higher level of education is likely to increase understanding of the conditions and needs of hemodialysis patients and increase the financial independence of the caregiver, thus making it less difficult to provide care services to older people. Married caregivers may also be more tolerant of the burden of care due to their higher sense of responsibility to their parents than to single people. The level of education in the results of the studies of Dastyar et al. (2020)(41) and Ashghali Farahani et al. (2016) (47) is also a factor in predicting the care burden and ultimately elder abuse by family caregivers.

Conclusion

The results of the present study showed that the prevalence of elder abuse by family caregivers among the older adults under hemodialysis is high. Therefore, it is necessary to intervene to increase screening activities for early recognition and secondary interventions by geriatric health policy makers. Providing psychological counseling, especially when the patient is referred to a medical center for hemodialysis, can reduce the consequences of elder abuse. The best time to train caregivers is when they are with the elderly in medical centers and hemodialysis departments. Healthcare providers can develop and implement training and counseling programs to achieve the goal of reducing elder abuse at a time when the elderly are hospitalized for at least 3 to 4 hours.

The results of the present study showed that one of the effective factors in elder abuse is the care burden. In the first step, intervention programs should be developed to reduce the care burden of family caregivers. Community support services need to be designed so that family caregivers can take advantage of the care they receive. Psychological interventions for family caregivers, such as participating in community support groups, getting help from formal caregivers, and getting help from other family members may reduce their care burden.

The results of the study showed that the dependence of the elderly on caregivers is associated with an increase in elder abuse cases. Primary prevention activities should be developed continuously and based on the community and the family in order to reduce the risk factors for the elder abuse. Interventions such as training on how to care for the elderly, financial assistance for cases with complete dependence through centers such as state welfare organization and adequate social support for caregivers may reduce the factors affecting the elder abuse.

The results showed that living alone, being 70 years old or older and suffering from other chronic diseases increased the risk of elder abuse by family caregivers. Using assisted caregivers during limited hours, especially when the caregiver does not have the opportunity to provide care for the elderly, can reduce feelings of loneliness and psychological problems, such as depression. Given the number of care needs due to the elderly's involvement in other chronic diseases, sharing responsibilities between the primary caregiver and other family members and seeking professional help from formal caregivers can reduce the burden of care and thus reduce the likelihood of abuse.

Low level of education and being single is a risk factor for elder abuse. Therefore, the target group of educational and counseling interventions should be single caregivers with a low level of education.

Clinical Implication

- The results of this study, due to the high number of samples, provide a relatively broad view of the prevalence and factors influencing the elder abuse by family caregivers among the older adults under hemodialysis.
- The results of this study can help health policy makers to develop and implement care programs for older people experiencing hemodialysis.
- Using the SEM method to test the relationship between the studied variables.

Limitations

- Due to the prevailing culture in Iranian society regarding the preservation of the dignity of the family and children, it may have not been possible for the patients to respond to the items freely.
- The study's target group was older adults under hemodialysis and their family caregivers. Due to the nature of the disease, the participating patients may have experienced different abusing severities in different dimensions rather than the older people with other chronic diseases, so the results can only be generalized to this group of older adults and their family caregivers.
- The study used the elder abuse by family caregivers' questionnaire to investigate the elder abuse and its dimensions. The data collected with this tool cannot confirm whether or not the abuse actually occurred. However, we consider it the best tool available to achieve the goal of our study because it has acceptable validity and reliability for measuring the structure we want.
- Understanding elder abuse by family caregivers varies from culture to culture, so generalizing the results may impair them.
- Given the self-reported nature of the abuse questionnaire, the likelihood of the elderly feeling guilty about talking about the subject and the problems they endure can affect the prevalence and severity of the phenomenon.

Abbreviations

CKD

Chronic kidney disease

HD
Hemodialysis
SEM
Structural Equation Modeling

Declarations

Ethics approval and consent to participate

Permission was obtained from the Ethics Committee of Babol University of Medical Sciences (IR.MUBABOL.HRI.REC.1394.177.). Objectives and research methods were explained to the participants. The Conscious Satisfaction Form was completed by the participants they were explained about their right for leaving the study at any stage. Obtaining written consent form from the samples. The principles of confidentiality of information were observed and the participants' names were not inserted on any tool at any stage of the study.

Consent to publish

Not applicable.

Availability of data and materials

Data generated or analysed during this study are included in this published article and are available from the corresponding author on reasonable request.

Competing interests

The authors report no conflicts of interest in this work.

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Author's contribution

A.M. researched data. F.GH. wrote the manuscript and researched data. A.SH. reviewed/edited the manuscript. A.A. and Z .F. contributed to discussion and reviewed/edited the manuscript. F.GH. and A.M. researched data and contributed to discussion. All authors read and agreed the final submitted manuscript.

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Figures

Figure 1

Standard coefficients of the modified model

Figure 2

Structural Equation Modeling Results: The Relationship between Care burden and IADL with elder abuse by Family Caregivers Based on Demographic and Clinical Variables