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Activities of daily living independence in Iranian blind war survivors: A cross sectional study, 2008

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Aim: Assessment of activities of daily living (ADL) can be helpful for designing individualized rehabilitation programs for disabled individuals. Measuring and comparing the basic ADL (BADL) and instrumental ADL (IADL) independence between middle aged and senior Iranian blind war survivors (IBWS) was the aim of this study.

Methods: This cross-sectional study assessed BADL and IADL of 312 blind war survivors, using the Barthel Index and the Lawton–Bordy scale. Data collection was carried out in a recreational event for the blind war survivors in Mashhad, Iran, 2008.

Results: The majority of the participants were male (99%), and more than 80% had multiple injuries. None of them were independent in all BADL and IADL. Older groups were more dependent in IADL such as telephone use, drug management, financial management, and BADL such as walking on uneven surfaces, bed/chair transfer and using stairs. The functional status and activities' level differences between those aged younger than 50 years and those aged older than 50 years were significant ($P < 0.05$).

Discussion: In the present study, all the IBWS were dependent in at least one ADL. Multiple physical injuries could be one of the main reasons for the dependency in this group. IBWS aged older than 50 years were considerably more dependent in their BADL and IADL than the younger group. It appears that starting the fifth decade of age in IBWS might cause some considerable decrease in their function. Training and individualized rehabilitation programs are warranted. **Geriatr Gerontol Int 2013; 13: 741–750.**

Keywords: basic activities of daily living, blind, function, instrumental activities of daily living, physical injury, war.

Introduction

Although some inevitable age-related visual changes occur in older people, none of them cause blindness. Hence, the coexistence of some factors might cause significant visual impairment, even blindness, among seniors.[1] The type of dominant factor depends on the country region and state of development. Infectious diseases, for instance, are the most common causes of blindness in some developing countries, such as Nigeria in Africa[2] or Thailand in southeast Asia.[3] The most common worldwide factors resulting in blindness include age-related macular degeneration, diabetic retinopathy, cataract, glaucoma, traumatic brain damage,[1] and physical and chemical trauma to eyes.[4] War injuries, both physical and chemical, are considered to be factors contributing to blindness in the Iran–Iraq war (1980–1988). According to the time when injuries were sustained by IBWS, they are now mostly middle and old aged.[4]

People with visual acuity less than 1/10 or visual field limitation less than 20 degrees are considered blind. Based on the World Health Organization (WHO) estimation, the number of blind people worldwide is 39 million.[5,6] This number is predicted to increase to 75 million by 2020.[7] Approximately 82% of blind people are aged over 40 years, when approximately 6% of older adults are legally blind.[8–10] A majority of blind people,

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therefore, are middle aged, and will be seniors in the following decades, when they are not as active as during the previous decades of their lives. Then the number of seniors with blindness would be considerably higher in the following years.

Vision is one of the main senses providing the information that is required for interaction with the environment.[9] Vision plays an important role in motor learning and balance.[7] Vision loss is associated with mobility decline,[9] a high risk of falls,[10,11] being institutionalized,[12] restriction in social participation and poverty.[13] Visual damage has various consequences in human abilities, and can cause premature aging.[11–13] When it comes to seniors, the consequences is broader and more complicated. Congdon *et al*. reported not only a significant decline in cardiovascular functions and cognition, but also in unintentional injuries, arthritis, falls and hip fractures, depression, and decreased health-related quality of life as consequences of blindness in seniors.[1,14]

Severe vision loss or blindness and their consequences can constrain health services accessibility (availability and affordability). Apparently, because of limited job positions for blind people and extreme competition in the labor market, the socioeconomic status of blind people is considerably lower than that of the normal-vision population.[15] Comorbidity of health problems increases the level of dependency of blind people, and raises the costs of living as well.[16] Another aspect of the burden of blindness, not having been well described, is the impact of blindness on function.[17] Vision loss, as a disability, limits function and drastically alters the level of independence.[1]

The concepts of disability and function have been variously considered in different models and perspectives. Activity of daily living (ADL) is one of the most common concepts of function, especially among disabled and older people, and can be used as a practical measure of ability or disability. The ADL, defined as the things we do in daily activities (e.g. self-care, leisure or work), are commonly divided into two categories: basic ADL (BADL) and instrumental ADL (IADL).[18,19] BADL refer to feeding, grooming, bathing, bowel control, bladder control, toilet use, stepping, walking on uneven surface, bed or chair transfer, and dressing. IADL include telephone use, food preparation, housekeeping, clothes washing, drug management, financial management, shopping and transport.[20] Alternative methods have been used for functional assessment in visually impaired,[21–23] but not in blind people.

Blind people, in comparison with low-vision and normal-vision peers, experience more limitations in daily activities, such as dressing, bathing, bed or chair transfer.[1,24] Most of the studies show that an extreme loss of function, especially ADL (i.e. BADL and IADL), is one of the crucial corollaries of blindness.[9,17,25] Although using rehabilitation procedures can significantly improve their abilities,[9,26] in comparison with the normal-vision population, people with blindness still require more help to carry out their ADL.[27] Some studies report that more than 50% of blind people are dependent in all of their ADL.[28] The result of vision loss will appear in the capacity of functional performance; as a result, BADL cannot be carried out efficiently.[29] Nevertheless, IADL are impaired more by vision loss, because they require more motor and cognitive challenges than BADL, even in known environments.[23] These constraints can often cause changes in performance and reduce the individual's autonomy. In comparison with younger and middle-aged people, such intrusive limits in seniors decrease their personal autonomy, and increase their dependency on relatives and social services.[15]

Attending to BADL and IADL is quite difficult for blind people, especially in older blind adults.[7,13,30] Blind seniors are more dependent in some activities, such as walking, transportation, transfer from bed or chair and food preparation, compared with normal-vision older adults.[14] They might also suffer from frailty earlier than their normal-vision peers.[31,32] Blind seniors, therefore, might encounter worse situations in terms of ADL than younger individuals with blindness. Existing studies report on blind people without any other concurrent problems; hence, there is a lack of evidence regarding ADL in blind people with other problems. The comparison of function and autonomy in blind people of different age groups has been missed in the research field. However, to the best of our knowledge, there is no published report about blind people and age-related functional decline. Therefore, the present study aimed to investigate BADL and IADL independence between the middle-aged and senior IBWS.

Methods

This research was a cross-sectional study and part of a larger study aimed to investigate the physical and mental conditions, as well as the health needs, of IBWS in 2008.

Participants

All IBWS are registered by The Bonyad Shahid va Omur-e Janbazan (Foundation of Martyrs and Veterans Affairs), an organization that is responsible for the registration of war survivors, and providing health services, financial and social support. A total of 680 registered IBWS were invited to take part in a recreational event in Mashhad, Iran. This event included some activities, such as visiting the tomb of a popular imam in Iran and musical performances. The present study evaluated all the participants who were aged over 40 years. The ethics board of the Foundation of Martyrs and Veterans

Affairs (war survivors) Medical and Engineering Research Center (JMERC) approved the project, and the ethical considerations were considered while the project was being designed and implemented. All participants had been individually informed about the aim and method of the study before signing the consent form. They could leave the study at any stage they wished.

Instruments

BADL and IADL were assessed by the Barthel Index[33] and the Lawton–Bordy scale,[34] respectively. The reliability of the Barthel Index was reported as 0.85,[33] and the internal correlation as 0.89.[34] The validity and internal consistency of the Persian (Iranian language) version of the Barthel Index was reported at 0.98 and 0.73 among blind war survivors, respectively.[35] The Lawton–Bordy scale, as an instrument for IADL, has been used in blind people before.[14,31,32,36] The reliability of the Lawton–Bordy scale was reported as 0.85[37] and 0.84[35] for the original and Persian[35] version, respectively.

The Bartel Index and the Lawton–Bordy scale represent both qualitative and quantitative measures. According to the instructions of the instruments, the qualitative measures were used in data analysis and every participant was categorized into being "independent" or "dependent" in each activity.

Data gathering and analysis

Data were collected by a trained interviewer. Before the data collection, the interviewer reviewed the questionnaire, and discussed any question or inquiry about the questionnaires and methods with the investigators. In a pilot study, the interviewer practiced with five interviewees to achieve a high level of experience. IBWS who wished to participate in the study signed the consent forms before starting the data collection.

Data cleaning was carried out at the field, whereas data gathering was in progress. Only 1% of the filled questionnaires were not sufficiently completed; subsequently they were revised and corrected as far as the participants cooperated.

The collected data were entered into SPSS version 16.0 (SPSS, Chicago, IL, USA) by an operator. Data analysis, including ANOVA, Pearson's test, crosstabs and logistic regression models were based on the objectives and research questions. In order to enter the types of comorbid injuries to a logistic regression model, five dummy variables (unilateral wrist disarticulation; [UWD], bilateral wrist disarticulation [BWD], bilateral lower limb amputation [BLLA], psychological problems and face) were created. Data analysis were carried out and compared in three age groups: 40–49 years, 50–59 years and over 60 years. The data are presented as mean ± standard deviation (SD). The statistical significance is determined at the level of alpha = 0.05.

Results

Of 630 IBWS who were invited by the Foundation of Martyrs and Veterans Affairs, 402 (64%) agreed to participate in the study. A total of 312 participants who were aged over 40 years were included in the data analysis (mean age 47.30 ± 6.71 years; Table 1). More than 99% of the participants were male. All of the participants were married with no case of divorce or separation. The majority of them (82.0%) were unemployed. The education status was categorized into different levels including school education (35.4%), high school diploma (11.9%), Associate's Degree (17.9%), Bachelor (21.8%), Master and Doctorate degrees (13%).

Approximately 40% of the participants were aged less than 20 years at the time of injury. The mean duration of blindness was 22.1 ± 6.34 years. The vast majority of the participants (98%) had been wounded and injured in landmine fields; and because of explosive warfare,

Table 1 Demographic characteristics of Iranian blind war survivors aged over 40 years ($n = 312$)

	n	%	Cumulative %
Age group (years)			
40–49	237	76.0	76.0
50–59	52	16.7	92.7
Over 60	23	7.3	100.0
Employed	58	18.6	–
Unemployed	254	81.4	–
Married	312	99.4	–
Single	2	0.6	–
Education			
High school	83	35.8	35.8
Diploma	31	13.4	49.1
Associate Degree	42	18.1	67.2
BS	48	20.7	87.9
MS and PhD	28	12.1	100.0
Frequency of physical injuries			
Shrapnel hit to face	140	34.3	–
Shrapnel hit to head	98	24.0	–
Shrapnel to trunk	94	23.0	–
Shrapnel to extremities	86	21.1	–
Ear	60	14.7	–
Teeth	47	11.5	–
BWD	19	4.7	–
UWD	16	3.9	–
Chemical weapon	19	4.7	–
ULLA	10	2.5	–
BLLA	2	0.5	–

BLLA, bilateral lower limb amputation; BWD, bilateral wrist disarticulation; ULLA, unilateral lower limb Amputation; UWD, unilateral wrist disarticulation.

Table 2 Activities of daily living in the Iranian blind war survivors aged over 40 years ($n = 312$)

ADL	Independent		Dependent		Total
	n	%	*n*	%	
Feeding	268	88.5	25	11.5	303
Bathing	267	87.8	37	12.2	304
Grooming	234	77.2	69	22.8	303
Bladder control	263	87.4	38	12.6	301
Bowel control	283	95.3	14	4.7	297
Dressing	269	88.5	35	11.5	304
Toilet use	277	90.8	28	9.2	305
Bed/chair transfer	247	81.8	55	18.2	302
Using stairs	237	78.5	65	21.5	302
Walking	102	33.8	200	66.2	302
IADL					
Telephone	239	78.4	66	21.6	305
Shopping	40	13.2	263	86.8	303
Food preparation	26	8.5	278	91.5	304
House Keeping	34	11.2	271	88.8	305
Cloth washing	76	25.1	227	74.9	303
Transport	48	15.8	256	84.2	304
Drugs	185	64.5	102	36.5	287
Finance	50	16.4	254	83.6	304

Activity	No. dependent war survivors (%)		
	40–49 years *n* = 237	50–59 years *n* = 52	Over 60 years *n* = 23
Telephone†	40 (17.0)	18 (34.6)	13 (56.5)
Medication‡	71 (32.4)	17 (36.6)	14 (63.6)
Finance†	185 (80.4)	48 (94.1)	21 (91.3)
Stairs†	191 (82.0)	35 (68.6)	17 (73.9)

†Utilizing Pearson's test the differences between age groups of 40–49 years and 50–5 years was significant at $P < 0.05$. ‡Utilizing Pearson's test the differences between age groups of 50–59 years and over 60 years was significant at $P < 0.05$.

most of them (81.3%) had experienced multiple injuries. The most prevalent war-related injury was shrapnel hits to one's face, and the least prevalent injury was BLLA (Table 1).

All of the participants were dependent in at least one ADL, either BADL or IADL (Table 2). The participants with higher education were more likely to be independent in their ADL. Carrying out the χ^2-test, the difference of the number of independents between different education levels was statistically significant in eating ($P = 0.005$), bowel control ($P = 0.001$), walking on uneven surfaces ($P = 0.002$), transfer from bed or chair ($P = 0.003$), telephone use ($P < 0.0001$) and financial management ($P = 0.033$).

In the age group of 50–59 years, most of the IBWS were dependent in financial management (94.1%) and using stairs (68.6%). A similar trend was seen in the age group of 40–49 years. In addition, telephone use (56.5%) and medication management (63.6%) dependency were considerable in the participant group of 60 years and older, compared with younger age groups (Table 2).

Analysis of BADL and IADL, using Pearson's test, showed significant differences in independence between the three age groups, as older groups were more dependent than younger groups. There were significant statistical differences of the number of IBWS between the 40–49 years and 50–59 years groups in telephone use, drug management, financial management, walking on uneven surfaces, bed/chair transfer and using stairs. However, the age groups of 50–59 years and over 60 years showed no significant differences except in medication management and telephone use (Table 2).

IBWS with comorbid injuries were more likely to be dependent in BADL (feeding, bathing, dressing, toilet, using stairs, bed/chair transfer and grooming), which was related to the types of injuries. Wrist disarticulations, both unilateral and bilateral, had the most impact

Table 3 Comorbid injuries and basic activities of daily living/instrumental activities of daily living dependency in Iranian blind war survivors ($n = 312$)

BADL/IADL	Type of injury	χ^2	P	Pearson R
Shopping	Face	4.951	0.026	0.112
Feed	UWD	16.182	<0.001	–0.203
	BWD	31.168	<0.001	–0.282
	Psychological	10.64	0.001	–0.165
Bathing	UWD	10.832	0.001	–0.166
	BWD	22.282	<0.001	–0.238
Dressing	UWD	20.783	<0.001	–0.229
	BWD	60.912	<0.001	–0.393
Toilet	BWD	36.529	<0.001	–0.304
Using stairs	BLLA	7.047	0.008	–0.134
Bed/chair transfer	Face	5.533	0.019	0.119
	BLLA	9.781	0.002	–0.158
Grooming	BWD	14.09	<0.001	–0.190

Utilizing *t* independent test revealed that there was no statistically significant difference of the time after injuries between dependent and independent groups in basic activities of daily living and instrumental activities of daily living. BLLA, bilateral lower limb amputation; BWD, bilateral wrist disarticulation; UWD, unilateral wrist disarticulation.

on BADL (Table 3). IBWS with face injuries were more likely to be dependent in shopping, as IADL, compared with IBWS without this injury (Table 3).

Logistic regression models were carried out for every BADL and IADL activity separately, entering age and education categories. The probability of telephone use, financial management, bed/chair transfer and walking on uneven surfaces dependence was likely to decrease significantly as the education level increased, when the age was held constant. The IBWS aged over 50 years were more likely to be significantly dependent in telephone use compared with 49-year-old and younger individuals, when education was held constant (Tables 4,5).

When the types of comorbid injuries, as the independent dummy variables, were entered in the models, the results were different. However, the effect of education had no considerable change in the later models. Age (odds ratio [OR] = 2.924, $P = 0.017$), education (OR = 0.679, $P = 0.016$) and BWD (OR = 5.713, $P = 0.033$) significantly impacted on the probability of telephone use dependency, so more educated IBWS were less likely to be disabled in telephone use. Then, the older IBWS were more likely to be disabled in telephone use. IBWS with BWD were more likely to be disabled in telephone use compared with IBWS without this impairment (Table 4). The probability of bathing dependency was significantly more in the IBWS with UWD (OR = 18.734, $P = 0.004$) and BWD (OR = 42.946, $P < 0.001$), holding the age and education constant. Feeding, as one of the BADL, was significantly influenced by UWD, BWD, face trauma and the length of injury. The probability of feeding, dressing and toilet use dependency were significantly higher in the IBWS with UWD and BWD, when age and education were held constant. IBWS with BWD also were significantly more likely to be dependent in bladder control and grooming. In contrast, people with face trauma were less likely to be dependent in grooming (Table 6).

Discussion

The present cross-sectional study is one the few studies carried out among a large sample of middle-aged and older IBWS. Most of the IBWS took part in the recreational event that was organized by the Foundation of Martyrs and Veterans Affairs.

Like many other countries, the Iranian population, including the IBWS population, is aging quickly. During the Iran–Iraq war (1980–1988[38,39]) most of the Iranian soldiers were young, so most of this population is going to be aging soon. Despite increasing research in the area of gerontology in Iran, it is almost impossible to access the war survivors for research. Therefore, these people are easily excluded from studies. The present study can provide useful information about this vulnerable part of the population. At least two of the authors of the present study (RA and HH) have a great deal of experience in the area of research among IBWS and were at the core of designing this study. They had permission to access and publish the data related to this study. Beside blindness, most of the participants experienced war as a stressful period, and had to learn to live with concurrent physical and psychological injuries and problems for a long time. Therefore, the participants might be different from people who have blindness without any concurrent problem. Almost all of the participants living with blindness for almost two decades or more were male.

Table 4 Logistic regressions of instrumental activities of daily living in Iranian blind war survivors aged over 40 years

	Financial ($n = 255$)				Telephone ($n = 230$)			
	Model 1		Model 2		Model 1		Model 2	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Age†	3.362	0.974–11.608	3.320	0.900–12.243	2.401*	1.153–5.002	2.924*	1.212–7.057
Education	0.716**	0.560–0.916	0.691**	0.528–0.904	0.705**	0.542–0.915	0.679*	0.494–0.932
UWD	–	–	2.9×10^8	0.000–	–	–	3.086	0.426–22.378
BWD	–	–	6.26×10^8	0.000–	–	–	5.713*	1.152–28.324
Psychological	–	–	2.148	0.455–10.149	–	–	1.308	0.437–3.912
Face	–	–	1.357	0.624–2.951	–	–	1.343	0.605–2.981
Length of injury	–	–	0.982	0.896–1.075	–	–	0.983	0.925–1.044
Constant	9.695***		11.716*		0.430		0.430	
χ^2	14.450**		22.975**		15.684***		20.504**	
Cox & Snell R^2	0.062		0.112		0.066		0.098	
χ^2 (H&L)	4.679		4.661		5.240		4.691	

***$P \leq 0.001$, **$P \leq 0.01$, *$P \leq 0.05$. †Age groups: below 50 years is the reference. BWD, bilateral wrist disarticulation; CI, confidence interval; H&L, Hosmer–Lemeshow test; OR, odds ratio; UWD, unilateral wrist disarticulation.

Table 5 Logistic regressions of basic activities of daily living in Iranian blind war survivors aged over 40 years regarding age and education

Independent variables	Bathing ($n = 226$)		Food ($n = 225$)		Dressing ($n = 229$)		Bladder ($n = 224$)		Toilet ($n = 227$)		Bed/chair ($n = 224$)		Grooming ($n = 226$)		Walk ($n = 225$)	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Age†	0.932	0.318–2.728	0.978	0.362–2.640	1.313	0.510–3.381	1.454	0.577–3.664	0.883	0.273–2.854	1.957	0.873–4.386	0.616	0.250–1.515	1.421	0.682–2.963
Education	0.766	0.547–1.072	0.800	0.588–1.088	0.973	0.734–1.302	0.719*	0.519–0.997	0.830	0.586–1.176	0.588**	0.375–0.794	0.830	0.649–1.061	0.672***	0.550–0.821
Constant	0.207		0.225***		0.133***		0.256**		0.148***		0.518		0.399*		4.549***	
χ^2	2.614		2.183		0.382		5.703		1.141		18.413***		2.295		18.830***	
Cox & Snell R^2	0.012		0.010		0.002		0.025		0.005		0.079		0.013		0.080	
χ^2 (H&L)	5.544		4.806		1.981		2.700		2.598		5.333		3.335		3.768	

***$P \leq 0.001$, **$P \leq 0.01$, *$P \leq 0.05$. †Age groups: below 50 years is the reference. CI, confidence interval; Hosmer–Lemeshow test; OR, odds ratio.

Table 6 Logistic regressions of basic activities of daily living in Iranian blind war survivors aged over 40 years regardimg age, education and physical injuries

Independent variables	Bathing (n = 195) OR	95% CI	Food (n = 194) OR	95% CI	Dressing (n = 197) OR	95% CI	Bladder (n = 192) OR	95% CI	Toilet (n = 195) OR	95% CI	Bed/Chair (n = 193) OR	95% CI	Grooming (n = 194) OR	95% CI	Walk (n = 193) OR	95% CI
Age†	0.711	0.158–3.198	0.699	0.169–2.890	1.4000	0.362–5.420	2.309	0.786–6.788	1.181	0.236–5.909	1.382	0.541–3.528	0.503	0.178–1.427	2.006	0.861–4.676
Education	0.705	0.448–1.109	0.798	0.521–1.221	0.994	0.653–1.513	0.743	0.508–1.086	0.859	0.536–1.377	0.546**	0.375–0.794	0.806	0.605–1.075	0.700**	0.562–0.871
UWD	18.734**	2.581–135.984	46.558**	4.055–534.574	46.119**	4.483–474.408	0.000	0.000	32.001**	3.705–276.426	2.052	0.268–15.722	5.466	0.808–36.972	1.801	0.17–19.025
BWD	42.946***	7.321–255.050	96.988***	13.687–687.26	169.815***	16.676–1729.273	10.437**	1.933–56.354	44.858**	7.429–270.854	4.048	0.62–26.443	11.952**	2.473–57.767	1.792	0.388–8.269
Psychological	1.338	0.263–6.809	2.862	0.672–12.198	2.008	0.454–8.881	1.630	0.453–5.865	1.648	0.273–9.945	2.213	0.743–6.594	1.523	0.492–4.716	3.124	0.978–9.983
Face	0.635	0.187–2.155	0.265*	0.070–0.998	0.394	0.109–1.427	0.535	0.195–1.466	0.406	0.098–1.688	0.441	0.179–1.086	0.401*	0.173–0.930	1.046	0.558–1.959
Length of injury	0.909	0.909–1.180	1.196*	1.007–1.421	1.053	0.918–1.208	0.962	0.902–1.026	1.197	0.980–1.462	1.047	0.960–1.141	1.122	0.999–1.260	0.998	0.938–1.061
Constant	0.070		0.090***		0.023*		0.518		0.087***		0.236		0.294*		3.027	
χ^2	28.834***		46.314***		46.417***		16.438*		29.510***		25.556**		23.874**		24.457**	
Cox & Snell R^2	0.137		0.212		0.210		0.082		0.140		0.124		0.116		0.119	
χ^2 (H&L)	3.068		8.648		10.935		3.314		4.418		9.081		23.194**		1.541	

***$P \le 0.001$, **$P \le 0.01$, *$P \le 0.05$. †Age groups: below 50 years is the reference. BWD, bilateral wrist disarticulation; CI, confidence interval; Hosmer–Lemeshow test; OR, odds ratio; UWD, unilateral wrist disarticulation.

Interestingly, despite the increasing divorce rate in Iran, all of the participants were married with no reported divorce. This needs to be studied in depth in future research. The IBWS were all dependent in BADL and IADL. Furthermore, older IBWS showed higher levels of BADL and IADL dependency, and less educated IBW were more BADL- and IADL-dependent as well.

Most of the study participants were male, because the injuries had mostly occurred in landmine fields and battles, so men are dominant in this group of war survivors. The majority of the participants were paid a monthly pension approximately equal to $1000, and were provided full health insurance by the Foundation of Martyrs and Veterans Affairs; more than 80% of the participants were unemployed. Currently, there is a lack of evidence relating to unemployment among blind people in Iran. The high rate of unemployment could be related to the fact that the pension could be enough to sustain an economic status at a moderate level. In addition, job opportunities for disabled people might be scarce, especially for blind individuals in Iran, although there are not many jobs a blind person cannot do at all, even though he/she might be limited somehow. Also, culturally, many families might not let disabled people work, and they might consider this treatment as a kind of honor and support.

Education is one of the most crucial rights that blind people can aspire to in the current century, especially in developing countries. The foundations relating to blind individuals aim to educate blind people to prepare them to become contributing members of their societies.[40–42] However, the main aim of education and training in blind people is acquiring skills that can make them more independent in daily living.[43] All of the participants were dependent in BADL and IADL. However, none of the IBWS had received classic training to develop skills of living with vision loss at the time of study.[35] Training for skills required for carrying out ADL, especially individualized programs, is highly suggested for inclusion in rehabilitation services for the IBWS offered by the Foundation of Martyrs and Veterans Affairs. The participants were mostly academically educated. It should be noted that veterans have a quota for entering Iranian universities. A considerable relationship between education and ADL independence could be seen in the way that the number of independent individuals with higher education in all of the activities was higher, especially for those who had diplomas or university degrees. Amini *et al.* reported the same relationship between education and BADL in IBWS in 2007.[44] Evidence suggests that educated people tend to have better health.[45–47] However, in the present study, it might not be possible to determine if academic education resulted in independence, or if the IBWS who were more independent could continue academic education. More specific studies need to clarify this relationship.

Amini *et al.* reported, as the first national report, that the majority of IBWS in 2007 were dependent in BADL. They showed that the age and duration of blindness were significant predictors of BADL scores, and the scores of BADL were significantly higher in IBWS who were younger. They did not include IADL as part of the function; furthermore, the BADL dependency was analyzed as one combined and continuous variable in the study by Amini *et al.* in 2007.[44] Understanding the level of independence among IBWS can be helpful to determine the starting age for a considerable decrease in the level of function in IBWS, so that the rehabilitation programs can be designed to improve the level of independence among this group. The aim of the present study was to measure and compare the level of independence in implementing daily activities in different age groups of IBWS.

The present study showed that almost all IBWS were dependent in at least one of the ADL. However, the types of activities were dissimilar among different people. This suggests designing individualized rehabilitation programs for IBWS. No study has reported about Iranian blind people; hence it might not be possible to compare this group with other blind people in Iran. In 2007, Amini *et al.* reported that 91.7% of IBWS were dependent in their ADL.[44] According to the Iranian culture that encourages people to support their seniors and disabled family members, all IBWS were supported/helped by family members, such as spouses or children, as caregivers. They carry out BADL and IADL, and sometimes even make them dependent in doing ADL. As it is very important to maintain activities at basic levels, individualized training and rehabilitation programs could play a valuable role in making IBWS more independent and decrease their dependence on caregivers and family members. This needs to be investigated by carrying out well-designed, randomized, controlled trials.

The effect of age on different functions is not similar. In other words, some activities might be influenced significantly by aging, and some might not. The comorbid injuries are absolutely crucial in order to estimate the impact of age on function of IBWS. Overall, the IBWS prematurely experience dependency and decline in their functions and daily activities. While people are aging, especially after middle age, considerable decreased functions occur, and it is more likely to make them increasingly dependent in ADL.[48] In old age, some activities; including stepping, bladder control, walking on uneven surfaces and bathing, can predict the level of independency in a normal population.[18,49] In addition to the aging effects, the ability of communication with the environment declines when visual impairment occurs. Functional performance, therefore, decreases especially during walking activity. In other words, visual impairment involves mobility, as blind people have more difficulties in mobility than people with normal vision.[9] As the vast majority of IBWS simultaneously suffered from multiple physical injuries and blindness, apparently they would even have more difficulties in mobility than people who just suffer from visual loss;[44] thus, more studies are required in this field that compare these groups in terms of ADL. The critical issue is the age at which considerable changes in function and independence occur. Existing evidence suggests that the aging process or considerable decrease in function usually occurs earlier among disabled people.[50,51] Therefore, future well-designed longitudinal studies are required on the aging process among disabled individuals, especially people with multiple injuries to determine if the aging process might start earlier among blind people. Also, we might be able to postpone the aging process, or progressive decreased function, in this vulnerable group of the population.

Health service providers and decision makers need to classify people in different age groups to afford suitable services.[48] Although determining the criteria of old age is controversial, considerable decline in performance and more functional dependence are counted as aging criteria in most cases. The age of 65 years has been designated as the beginning of old age in many countries.[52] Considering the results of some studies, the aging process might start 15–20 years earlier in people with physical disabilities[53–57] than in the normal population.[55] According to the earlier retirement of people with disability than the normal population,[58,59] many countries, such as the USA,[60] Britain,[58] Spain,[61] Australia,[36] Algeria[62] and France,[61] dropped the age of retirement for disabled individuals. In Iran, the retirement age for the disabled is 10 years earlier than that of the normal population. This should be confirmed by a special commission as well.[63] Similarly, blind people might age earlier as well. Although the age of 50 years could be considered as the aging level, in the current study, analysis were carried out in the three age groups of 40–49 years, 50–59 years and over 60 years. Considering the findings of Amini *et al.*, IBWS showed a significant decline in independence at the age of 50 years.[4,44] However, there is lack of evidence particularly regarding people with blindness. In contrast to the earlier study, in 2006, our study found that the functional declines in IBWS are more likely to be to do with the physical injuries, especially upper limb impairments, rather than aging.

Comparing two age groups, below and above 50 years, the activities' level and functional status (mobility and transport) in IBWS aged over 50 years were significantly lower than those aged below 50 years, and this was the most considerable finding in the present study. The logistic regression models also showed that co-impact of other factors, such as physical injuries or the time of injury, can influence the effect of aging on

function. Most of the participants in the present study were in the 40–49 years age group, so in the future decades they will need new and different services in order to prevent the potential decrease that might occur in their activities and functions. Predicting their condition can help decision makers and service providers to design and provide effective interventions; then they can not only maintain, but improve their abilities and functional status.

The findings of the present study suggest the need for training and blindness rehabilitation, especially mobility and transportation training, in the IBWS. Rehabilitation in blind and visually impaired people, considering their physical impairments, aims to both instruct them and improve their abilities to be more independent in daily activities. In addition, rehabilitation programs help blind people to be more communicative, and have both safe mobility and transportation.[64] As home and town modifications can help disabled people to participate more in public activities, blind people need some special modifications to be more active, and move around conveniently. Assistive technology and devices could be helpful to improve the abilities and independence in daily activities and transportation of IBWS, especially when they become older. Also, setting particular social groups can make IBWS more communicative and sociable. Furthermore, these sorts of social groups can create the opportunity to support IBWS socially.

Although all of the IBWS (680) were invited to take part in the present study, only approximately 64% (402 out of 640) of them participated in the study. Although all IBWS were registered by the Foundation of Martyrs and Veterans Affairs, the registered information was limited to some identification. So, we were not able to determine the characteristics of the non-attending population because of the lack of information about them. The probable reasons for refusal to participate in the study were unknown to the researchers. This is acknowledged as one of the limitations of this study.

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