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Original article

Participation in work and leisure activities after stroke: A national study

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ABSTRACT

Background: Stroke is a common and debilitating neurological disorder having a negative impact on quality of life.
Objectives: We aimed to compare differences in participation in work and leisure activities between patients with and without a self-reported stroke at the national level in France.
Methods: This study used cross-sectional data from the Disability Health Survey that was administered in people's homes (DHH) in 2008 and in institutions (DHI) in 2009. Stroke history and levels of participation in work and leisure activities were collected by interviews. The levels of participation in these activities were compared between participants with and without a history of stroke.
Results: Among the 33,785 interviewed participants, 1725 reported a history of stroke. After weighting, this represented a mean (SD) of 766,641 (36,650) people among 49 million adults living in France. After adjustment, as compared with people without stroke, those with stroke were less likely to work (odds ratio 0.19 [95% confidence interval 0.13–0.27]), use the telephone (0.21 [0.17–0.25]) and drive (0.25 [0.21–0.32]). In the age group 19–59 years, as compared with people without stroke, those with stroke less frequently worked (35.9% vs. 72.2%), drove (54.3% vs. 81.3%) and participated in sports (26.6% vs. 55.8%).
Conclusions: Overall, our study indicates that people with a history of stroke report more difficulties in participating in work and leisure activities than those without a history of stroke.
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1. Introduction

Approximately 80 million people in the world have a history of stroke [1]. The prevalence of stroke is about 1.6% in the general population in France, and this figure is greater than 10% in men aged 85 years or older [2]. At the individual level, stroke is associated with physical morbidity [3], psychological distress [4] and mortality [5]. Stroke also has a substantial impact at the national level, with high health care costs [6].

Although stroke is frequent and is known to be one of the major causes of disability worldwide [7], only few studies have focused on the impact of stroke on leisure activities [8–12]. In addition, most previous studies were based on small sample sizes, did not include control groups and did not analyze the different leisure activities separately (e.g., sports, arts, board games). Numerous studies have recently been published regarding work activities, but findings are often difficult to generalize because the rate of return to work varies widely among countries and settings [10,13,14]. Decreased participation in work and leisure activities was found associated with poor quality of life in individuals with a history of

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stroke [15,16]. Therefore, investigating the participation of stroke survivors in these activities may be important for improving the care of these patients at the chronic stage of the disease.

The aim of this national study conducted in France was to compare the participation in work and leisure activities between individuals with and without a history of stroke.

2. Material and methods

2.1. Disability Health surveys

The Disability Health surveys have been described in previous studies [2,17,18]. Briefly, the aim of the Disability Health surveys, coordinated by the French Institut national de la statistique et des études économiques (INSEE; National Institute of Statistics and Economic Studies) and the Direction de la recherche, des études, de l'évaluation et des statistiques (Directorate of Research, Studies, Evaluation and Statistics) is to estimate the number of dependent or disabled people in the general French population, describe the overall functional health status of the population and document the incidence of different types of disability (i.e., physical, mental, cognitive, psychological). The secondary aim is, by using the International Classification of Functioning, Disability and Health (ICF), to describe the environmental factors favoring or limiting activities of daily living. Therefore, these detailed surveys explore social participation (i.e., work, family, social relations, leisure activities), discrimination and administrative recognition of disability, and human, technical and financial assistance. For the present study, data from 2 parts of the survey were analyzed: Disability Health at Home (DHH), performed in 2008, which covered the population living at home, and Disability Health in Institutions (DHI), which covered the population living in long-term institutions in 2009. The study had a nationally representative design.

2.2. DHH survey

Before the DHH survey, a preliminary survey, called the Daily Life and Health survey, was administered in 2007. A questionnaire was sent by mail to 127,200 homes that were randomly drawn from all over France. The questionnaire consisted of 26 questions, of which 13 were related to functional limitations, 1 to global activity limitations and 1 to the perception of disability. The response rate was 80% (102,000 homes, including 238,000 individuals). The database was then built from the responders of the preliminary survey. It consisted of 4 strata according to the severity of the reported level of disability (i.e., no disability and slight, moderate, and severe disability). To over-represent disabled people, participants with disability had a higher weight than those without disability in the statistical analyses. The survey was declarative and administered by face-to-face interview (with the help of family or caregiver if the interviewee was not able to answer alone). The level of participation in the interviews was 77%.

2.3. DHI survey

This complementary survey was carried out in institutions for older people (i.e., long-term health care units, establishments for dependent older people, retirement homes), institutions for disabled adults as well as psychiatric institutions and centers for social reintegration. Among the 1567 institutions sampled in France, 97% agreed to participate in the survey. The level of participation of institutionalized individuals was 90.9%.

2.4. Ethics statement

This study was planned as a research project. It was performed in collaboration with DREES. This study was declared of public interest by the Conseil national d'information statistique and was approved by the Commission nationale de l'informatique et des libertés (French law No. 78–17). According to French law in 2007, written informed consent was not required for this type of study. The data used were taken from the Disability Health surveys and were anonymized before analysis.

2.5. Study variables

The interview questionnaire was practically identical between both surveys. Participants were asked about their medical history. A list of 50 diseases was proposed (i.e., stroke) and the question was "Do you have or have you ever had any of these diseases or health problems? Subsequent questions focused on participation in work and leisure activities. For example, the following question was asked: "In the past 12 months, have you been to the movie theatre?", with yes and no answers. Fifteen activities were included in this study: playing board games, going to concerts, going to the movie theatre, reading, listening to music, watching television, doing arts, knitting, tinkering, playing sports, going to the museum, using the telephone, using the computer, driving the car, and working. Demographic variables collected included age and sex.

2.6. Statistical analysis

A database including the variables of interest was constructed for each survey. Individuals under 18 years of age were excluded. The databases (DHH and DHI) were then merged to represent the overall French adult population living at home and in institutions. This was a nationally representative study, and weights were calculated for both the DHH and DHI surveys. Adjustment variables included age and sex. All statistical analyses involved using statistical procedures adapted for complex survey plans (proc surveyfreq and proc surveylogistic, SAS Enterprise Guide v4.3), with stratifications and weights taken into account. Proportions of stroke survivors and controls participating in work and leisure activities were compared by using partial Wald tests. Age- and sex-adjusted odds ratios (ORs) with 95% confidence intervals (CIs) were further computed. The level of significance was set at $P < 0.05$.

3. Results

Among the 33,785 interviewed participants, 1,725 had a history of stroke. After weighting, this represented a mean (SD) of 766,641 (36,650) people among 49 million adults living in France. Participation in work and leisure activities (except for board games and art) was less likely with than without a self-reported history of stroke, with age- and sex-adjusted ORs ranging from 0.19 to 0.77 in the overall population (see Table 1 and Figure 1). The 3 activities that were the most affected by stroke were working (OR = 0.19 [95% CI 0.13–0.27]), using the telephone (0.21 [0.17–0.25]) and driving (0.25 [0.21–0.32]). The mean (SD) prevalence of work activity was 8.1% (1.3%) and 54.2% (0.4%) with and without a history of stroke and was 35.9% (4.8%) and 72.2% (0.5%), respectively, for participants 19 to 59 years old. The mean (SD) prevalence of driving was 38.7% (2.4%) and 76.1% (0.3%) with and without a history of stroke and was 54.3% (4.5%) and 81.3% (0.4%) for individuals 19 to 59 years old. The mean (SD) prevalence of sport activities was 16.9% (2.1%) and 49.2% (0.4%) with and without

Table 1
Participation in work and leisure activities by individuals with and without a history of stroke and by age group.

Activity	Overall population			19–59 years old		60–74 years old		75–84 years old		>85 years old	
	% Stroke	% No stroke	OR (95% CI)	% Stroke	% No stroke	% Stroke	% No stroke	% Stroke	% No stroke	% Stroke	% No stroke
Playing board games	29.3 (2.2)	36.1 (0.4)	1.06 (0.85–1.32)	34.8 (4.5)	37.9 (0.6)	27.5 (4.2)	32.4 (1.0)	31.7 (4.1)	30.5 (1.2)	22.1 (4.2)	28.6 (1.7)
Going to concerts	17.5 (2.0)	34.0 (0.4)	0.63 (0.47–0.84)	21.7 (3.9)	37.5 (0.6)	25.4 (4.9)	30.1 (1.0)	11.3 (2.7)	16.2 (1.1)	8.6 (2)	10.6 (1.3)
Going to the movie theatre	25.5 (2.0)	55.9 (0.4)	0.69 (0.54–0.88)	41.8 (4.6)	63.5 (0.5)	35.6 (5.0)	39.9 (1.0)	14.9 (3.0)	21.7 (1.2)	5.9 (1.5)	8.1 (1.1)
Reading books	45.5 (2.4)	58.8 (0.4)	0.72 (0.59–0.89)	46.2 (4.7)	60.4 (0.6)	54.9 (4.7)	58.5 (1.0)	40.7 (4.3)	49.2 (1.3)	35.7 (5.3)	42.3 (1.9)
Listening to music	52.1 (2.4)	81.3 (0.3)	0.77 (0.62–0.95)	73.1 (4.2)	89.5 (0.3)	62.5 (4.6)	67.9 (0.9)	40.1 (4.2)	48.3 (1.3)	29.4 (5.2)	33.5 (1.8)
Watching television	93.2 (0.8)	97.6 (0.1)	0.47 (0.35–0.62)	95.6 (1.3)	97.9 (0.17)	97.2 (0.9)	98.2 (0.2)	92.3 (1.7)	96.8 (0.3)	84.4 (2.6)	88.9 (0.9)
Doing arts	10.6 (1.7)	16.7 (0.3)	0.96 (0.66–1.40)	16.3 (3.9)	18.6 (0.5)	14.6 (3.8)	15.0 (0.8)	6.5 (3.1)	6.1 (0.6)	4.1 (1.5)	6.6 (1.1)
Knitting	14.6 (2.0)	22.7 (0.4)	0.41 (0.29–0.57)	14.9 (2.8)	20.3 (0.4)	20.6 (4.6)	32.0 (1.0)	11.3 (3.3)	27.4 (1.2)	9.1 (3.1)	15.7 (1.4)
Tinkering	40.8 (2.5)	65.8 (0.4)	0.33 (0.27–0.41)	48.2 (4.6)	67.5 (0.5)	53.9 (4.8)	72.7 (0.8)	32.9 (4.4)	48.2 (1.3)	21.6 (5.5)	23.4 (1.8)
Playing sports	16.9 (2.1)	49.2 (0.4)	0.41 (0.31–0.57)	26.6 (4.4)	55.8 (0.6)	21.5 (4.7)	41.4 (1.0)	11.9 (3.1)	16.9 (1.1)	5.4 (2.7)	6.3 (1.0)
Going to the museum	16.3 (1.9)	37.0 (0.4)	0.40 (0.30–0.53)	28.1 (4.3)	38.8 (0.6)	21.8 (4.2)	40.9 (1.0)	9.5 (2.7)	20.8 (1.2)	4.2 (2.6)	8.6 (1.3)
Using the phone	81.7 (1.3)	98.4 (0.1)	0.21 (0.17–0.25)	92.2 (1.6)	99.3 (0.1)	89.8 (1.7)	98.9 (0.1)	76.1 (2.8)	95.1 (0.3)	64.5 (4.1)	78.6 (1.1)
Using the computer	82.3 (1.4)	97.0 (±0.1)	0.40 (0.31–0.51)	90.4 (1.8)	98.7 (0.1)	88.1 (2.8)	96.3 (0.3)	78.9 (0.7)	89.3 (0.7)	67.7 (3.9)	76.2 (1.3)
Driving	38.7 (2.4)	76.1 (0.3)	0.25 (0.21–0.32)	54.3 (4.5)	81.3 (0.4)	51.4 (4.9)	75.6 (0.8)	30 (4.1)	45.3 (1.3)	12.1 (4.7)	18.8 (1.7)
Working	8.1 (1.3)	54.2 (0.4)	0.19 (0.13–0.27)	35.9 (4.8)	72.2 (0.5)	1.9 (1.0)	8.6 (0.6)	0	0.8 (0.3)	0.9 (0.8)	0.01 (0.01)

Data are mean (SD) unless otherwise indicated. OR: odds ratio; 95% CI: 95% confidence interval. Playing board games was assessed with the following question: "In the past 12 months, have you played board games?". Similar questions were used for the other activities. Odds ratios were adjusted for age and sex.

a history of stroke and was 26.6% (4.4%) and 55.8% (0.6%) for individuals 19 to 59 years old.

4. Discussion

To the best of our knowledge, this is the first national study investigating participation in work and leisure activities in people with a history of stroke. Participation in these activities was significantly lower in stroke survivors than people without stroke and was particularly low for working, using the phone and driving.

Several studies have analyzed a return to work after stroke, and there is some discrepancy in the findings of these previous analyses. For example, in 150 stroke survivors from India, only 20.7% were employed after a stroke, whereas this proportion was 62.7% before this neurological event [13]. More recently, a 2017 Swedish study found in 174 people $\leq$ 63 years old that the rate of return to work was 74.7% after 6 years of follow-up [14]. In our national study, the prevalence of participation in work was 35.9% in stroke survivors and 72.2% in controls aged 19 to 59 years. The discrepancy in the results from previous studies is likely explained by major differences in the treatment, management and rehabilitation of stroke survivors between these countries (i.e., India, Sweden, France), particularly between developed and developing countries [19]. Also, the present study is the first study with a national and cross-sectional design. Major predictors of a return to work after stroke seem to be dependency at discharge, aphasia, sick leave and alcohol consumption before the stroke, rehabilitation length of stay, anxiety, depression, and global functioning [14,20,21]. However, unfortunately, these studies featured selection bias (e.g., post-rehabilitation studies). Finally, little knowledge of predictors of a return to work is from large cohort studies, which needs to be improved. The low rate of employment among individuals with a history of stroke in the present study is of particular concern because lack of return to work in the post-stroke context is associated with low occupational satisfaction, decreased quality of life and poor emotional status [21–23].

We found that participation in leisure activities was less frequent with than without a history of stroke, and these results agree with the literature. For example, previous research of people with mild stroke found that the number of high-demand leisure activities (e.g., running, swimming, bicycling) decreased after stroke [24]. Later, a US study including a sample of 156 patients found that only 30.8% of the population returned to driving 6 months after stroke, and this reduced activity was significantly predicted by cognitive ability and motricity of lower extremities [25]. Finally, in 60 chronic stroke survivors, Korean researchers estimated that most had not returned to their pre-stroke level of leisure activity participation and that the mean number of activities had decreased from 3.9 to 1.9 [26]. The authors further showed that the most frequent barriers to participation in leisure activities were weakness and poor balance, lack of transportation, and cost. Although these previous studies have advanced the field, they feature several limitations that need to be acknowledged. First, because most of these analyses focused on only a few leisure activities, identifying the activities that are most affected by stroke is difficult. Second, these studies were based on small sample sizes, and thus their findings cannot be generalized. In contrast, with the inclusion of 15 activities (i.e., work, using the phone, driving) and with the use of weighted samples, the present national study including more than 33,500 participants is methodologically sound and sheds important light on participation in work and leisure activities after stroke.

These findings suggest that the rehabilitation of stroke survivors should be personalized and include leisure activities

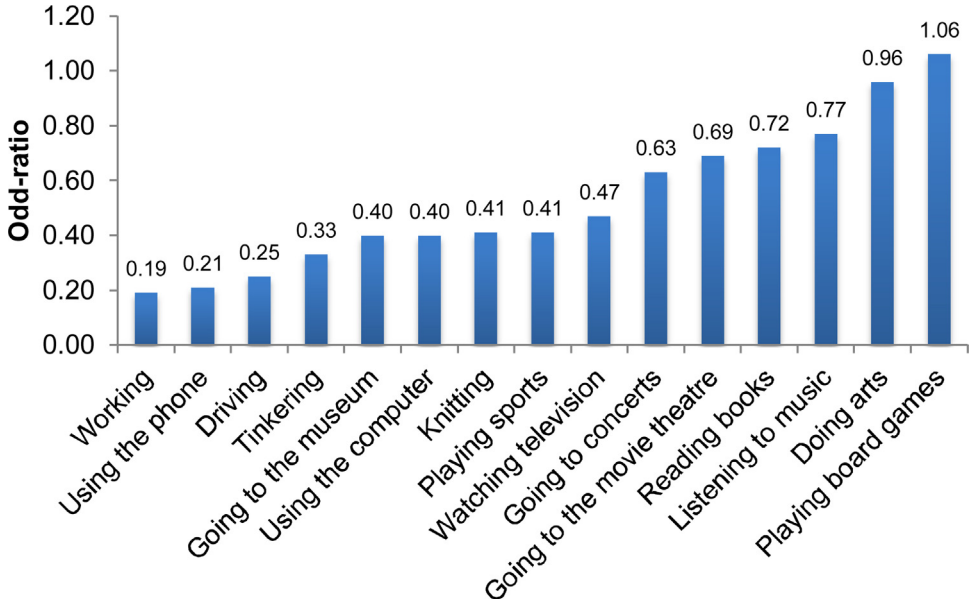

Fig. 1. Participation in work and leisure activities in stroke survivors versus controls in an ascending order. Odd ratios were adjusted for age and sex. All odds ratios are significant except for playing board games and doing arts.

performed before the stroke as goal of rehabilitation. Furthermore, participation in work and leisure activities may be improved at the societal level by several public health measures such as increasing the number of workplaces adapted to people with disabilities after stroke, favoring the development of cars with personalized pedals and cruise control and increasing the number of financial aids for family caregivers. Future studies should focus on the identification of predictors of participation in work and leisure activities in stroke survivors.

The strengths of the study include the large sample size and the use of nationally representative data and a control group. The use of a control group allowed us to define with accuracy the standard participation in work and leisure activities among the general population, and thus estimate the relative risk of non-participation in these activities among stroke survivors.

However, the study has several limitations. First, this was a cross-sectional analysis, stroke was self-reported, and we had no information about the exact time when stroke occurred, although this may have affected our findings. Second, our study could have benefited from more detailed questions on work and leisure activities before and after stroke. Finally, there was a lack of sociodemographic variables (e.g., income, education, type of employment, marital status), and we were thus unable to investigate their impact on rates of participation in work and leisure activities. Several of these variables are significantly associated with risk of stroke [27,28], and they may have introduced a bias in the statistical analyses.

Overall, our study indicates that people with a history of stroke report more difficulties in participating in work and leisure activities than those without a history of stroke.

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Disclosure of interest

The authors declare that they have no competing interest.

References

[1] World Stroke Campaign. World Stroke Day; 2018;2018, https://www.worldstrokecampaign.org/.
[2] Schnitzler A, Woimant F, Tuppin P, de Peretti C. Prevalence of self-reported stroke and disability in the French adult population: a transversal study. PloS One 2014;9:e115375. http://dx.doi.org/10.1371/journal.pone.0115375.
[3] Gallacher KI, Batty GD, McLean G, Mercer SW, Guthrie B, May CR, et al. Stroke, multimorbidity and polypharmacy in a nationally representative sample of 1,424,378 patients in Scotland: implications for treatment burden. BMC Med 2014;12:151. http://dx.doi.org/10.1186/s12916-014-0151-0.
[4] Jørgensen TSH, Wium-Andersen IK, Wium-Andersen MK, Jørgensen MB, Prescott E, Maartensson S, et al. Incidence of depression after stroke, and associated risk factors and mortality outcomes, in a large cohort of danish patients. JAMA Psychiatry 2016;73:1032–40. http://dx.doi.org/10.1001/jamapsychiatry.2016.1932.
[5] Brønnum-Hansen H, Davidsen M, Thorvaldsen P. Long-term survival and causes of death after stroke. Stroke 2001;32:2131–6. http://dx.doi.org/10.1161/hs0901.094253.
[6] Xu X-M, Vestesson E, Paley L, Desikan A, Wonderling D, Hoffman A, et al. The economic burden of stroke care in England, Wales and Northern Ireland: using a national stroke register to estimate and report patient-level health economic outcomes in stroke. Eur Stroke J 2018;3:82–91. http://dx.doi.org/10.1177/2396987317746516.
[7] Katan M, Luft A. Global Burden of Stroke. Semin Neurol 2018;38:208–11. http://dx.doi.org/10.1055/s-0038-1649503.
[8] Desrosiers J, Noreau L, Rochette A, Bourbonnais D, Bravo G, Bourget A. Predictors of long-term participation after stroke. Disabil Rehabil 2006;28:221–30. http://dx.doi.org/10.1080/09638280500158372.
[9] Hartman-Maeir A, Soroker N, Ring H, Avni N, Katz N. Activities, participation and satisfaction one-year post stroke. Disabil Rehabil 2007;29:559–66. http://dx.doi.org/10.1080/09638280600924996.
[10] Daniel K, Wolfe CDA, Busch MA, McKevitt C. What are the social consequences of stroke for working-aged adults? A systematic review. Stroke 2009;40:e431–40. http://dx.doi.org/10.1161/STROKEAHA.108.534487.
[11] McKenna K, Liddle J, Brown A, Lee K, Gustafsson L. Comparison of time use, role participation and life satisfaction of older people after stroke with a sample without stroke. Aust Occup Ther J 2009;56:177–88. http://dx.doi.org/10.1111/j.1440-1630.2007.00728.x.
[12] Wolfe CDA, Crichton SL, Heuschmann PU, McKevitt CJ, Toschke AM, Grieve AP, et al. Estimates of outcomes up to ten years after stroke: analysis from the prospective South London stroke register. PLoS Med 2011;8:e1001033. http://dx.doi.org/10.1371/journal.pmed.1001033.
[13] Sreedharan SE, Unnikrishnan JP, Amal MG, Shibi BS, Sarma S, Sylaja PN. Employment status, social function decline and caregiver burden among

stroke survivors. A South Indian study. J Neurol Sci 2013;332:97–101. http://dx.doi.org/10.1016/j.jns.2013.06.026.
[14] Westerlind E, Persson HC, Sunnerhagen KS. Return to work after a stroke in working age persons; a six-year follow up. PLoS ONE 2017;12:e0169759. http://dx.doi.org/10.1371/journal.pone.0169759.
[15] Vestling M, Tufvesson B, Iwarsson S. Indicators for return to work after stroke and the importance of work for subjective well-being and life satisfaction. J Rehabil Med 2003;35:127–31.
[16] Sveen U, Thommessen B, Bautz-Holter E, Wyller TB, Laake K. Well-being and instrumental activities of daily living after stroke. Clin Rehabil 2004;18:267–74. http://dx.doi.org/10.1191/0269215504cr719oa.
[17] Palazzo C, Ravaud J-F, Trinquart L, Dalichampt M, Ravaud P, Poiraudeau S. Respective contribution of chronic conditions to disability in france: results from the National Disability-Health Survey. PLoS ONE 2012;7:e44994. http://dx.doi.org/10.1371/journal.pone.0044994.
[18] Palazzo C, Ravaud J-F, Papelard A, Ravaud P, Poiraudeau S. The burden of musculoskeletal conditions. PLoS ONE 2014;9:e90633. http://dx.doi.org/10.1371/journal.pone.0090633.
[19] Rhoda A, Smith M, Putman K, Mpofu R, DeWeerdt W, DeWit L. Motor and functional recovery after stroke: a comparison between rehabilitation settings in a developed versus a developing country. BMC Health Serv Res 2014;14:82. http://dx.doi.org/10.1186/1472-6963-14-82.
[20] Black-Schaffer RM, Osberg JS. Return to work after stroke: development of a predictive model. Arch Phys Med Rehabil 1990;71:285–90.
[21] van der Kemp J, Kruithof WJ, Nijboer TCW, van Bennekom CAM, van Heugten C, Visser-Meily JMA. Return to work after mild-to-moderate stroke: work satisfaction and predictive factors. Neuropsychol Rehabil 2017;0:1–16. http://dx.doi.org/10.1080/09602011.2017.1313746.
[22] Röding J, Glader E-L, Malm J, Lindström B. Life satisfaction in younger individuals after stroke: different predisposing factors among men and women. J Rehabil Med 2010;42:155–61. http://dx.doi.org/10.2340/16501977-0497.
[23] Chang WH, Sohn MK, Lee J, Kim DY, Lee S-G, Shin Y-I, et al. Return to work after stroke: The KOSCO Study. J Rehabil Med 2016;48:273–9. http://dx.doi.org/10.2340/16501977-2053.
[24] Hildebrand M, Brewer M, Wolf T. The impact of mild stroke on participation in physical fitness activities. Stroke Res Treat 2012;2012. http://dx.doi.org/10.1155/2012/548682 [Article ID 548682:6 pgs].
[25] Aufman EL, Bland MD, Barco PP, Carr DB, Lang CE. Predictors of return to driving after stroke. Am J Phys Med Rehabil 2013;92:627–34. http://dx.doi.org/10.1097/PHM.0b013e318282bc0d.
[26] Yi TI, Han JS, Lee KE, Ha SA. Participation in leisure activity and exercise of chronic stroke survivors using community-based rehabilitation services in Seongnam City. Ann Rehabil Med 2015;39:234–42. http://dx.doi.org/10.5535/arm.2015.39.2.234.
[27] Bird Y, Lemstra M, Rogers M. The effects of household income distribution on stroke prevalence and its risk factors of high blood pressure and smoking: a cross-sectional study in Saskatchewan, Canada. Perspect Public Health 2017;137:114–21. http://dx.doi.org/10.1177/1757913916657118.
[28] Eshak ES, Honjo K, Iso H, Ikeda A, Inoue M, Sawada N, et al. Changes in the employment status and risk of stroke and stroke types. Stroke 2017;48:1176–82. http://dx.doi.org/10.1161/STROKEAHA.117.016967.