

Original Article

Review of the Prevalence of Chronic Fatigue Worldwide

Chang-Gue Son

Liver and Immunology Research Center of Daejeon University Oriental Hospital

Objectives: To obtain the features of prevalence of chronic fatigue and chronic fatigue syndrome worldwide.

Methods: All research reports for prevalence of chronic fatigue and chronic fatigue syndrome were selected from PubMed, KMBase and KISS database, and the prevalence were analyzed according to the symptoms and countries.

Results: A total of 39 articles from 13 other countries and 4 articles from Korea met the criteria of this study. The prevalence of chronic fatigue and chronic fatigue syndrome was about 10% and 1% respectively. The prevalence for Korean was 17.7% and 1.4% respectively, however the data have a limitation due to the lack of well-designed studies.

Conclusions: This report can provide essential information to build a strategy for development of therapeutics against chronic fatigue and chronic fatigue syndrome using traditional Korean medicine.

Key Words : Chronic fatigue, Idiopathic chronic fatigue, chronic fatigue syndrome, prevalence, Korean medicine

Introduction

Fatigue is one of the most prevalent symptoms in modern society. This subjective illness generally disappears after taking rest or treating causative diseases, but uncontrolled chronic fatigue raises a variety of problems in physical and social activities¹⁾. One report from the United States presented that untreated chronic fatigue syndrome reduced the work-force productivity by 54% of afflicted individuals leading to 9.1 billion dollars of total productivity loss in the US²⁾. The characteristic of chronic fatigue is not peripheral fatigue such as decreased muscular power or endurance but central fatigue including memory loss, difficulty of concentration or decline of desire, which impairs physical well-being, psychological and social aspect, and leads to social

isolation³⁾.

In particular, idiopathic chronic fatigue (ICF) or chronic fatigue syndrome (CFS), medically unexplained fatigue lasting over 6 months, doesn't have defined pathophysiology or standard treatment⁴⁾. Thus many patients with chronic fatigue frequently chose the therapeutics of complementary and alternative medicines⁵⁾. Koreans traditionally have used traditional Korean medicine (KM) for cases of chronic fatigue. This would result from the strong points of KM which attaches great importance to subjective symptoms in diagnosis and treatment of diseases^{6,7)}. Accordingly, a KM-based national strategy is needed to strengthen the medical competitiveness for chronic fatigue-associated disorders, however there is a lack of systematic research and developments in Korea⁸⁾.

It is known that the population complaining of

• Received : 7 April 2012

• Revised : 31 May 2012

• Accepted : 31 May 2012

• Correspondence to : Chang-Gue Son

Liver & Immunology Research Center, Daejeon Oriental Hospital of Daejeon University
22-5 Daeheung-dong, Jung-gu, Daejeon, Korea 301-724

Tel : +82-42-229-6807, Fax: +82-42-254-3403, Email : ckson@dju.ac.kr

fatigue is increasing due to the rapid urbanization and severe stress in competitive society. There are large differences in prevalence of chronic fatigue according to the countries or study population⁹⁻¹². The Korean Health Insurance Review Agency reported the number of visiting days and medical expenses increased by 12.4% and 46.5% in 2008 compared with 2003¹³. Nevertheless, no data for the accurate prevalence of chronic fatigue for the general population exist because of lack of studies.

This study aimed to review the prevalence of chronic fatigue and CFS in countries worldwide. This data will be essential information helpful for the further studies focusing on the characterization of chronic fatigue in Korea and development of KM-derived therapeutics.

Methods

1. Study design

In order to compare the features of prevalence of chronic fatigue and chronic fatigue syndrome worldwide, all research reports from countries including Korea were reviewed and analyzed.

2. Data collection

All papers published by February 2012 were collected from the medical databases Pubmed (<http://www.ncbi.nlm.nih.gov/PubMed>) in the USA and Kibase (<http://kibase.medic.or.kr>) and KISS (<http://kiss.kstudy.com/>) in Korea. Papers were screened using the following inclusion criteria: (a) clinical study, (b) question for prevalence, (c) subjects are general population, and (d) targets for chronic fatigue or CFS. The initial assessment using the inclusion criteria was made by reading abstracts. Articles that appeared to meet the criteria were then read in full.

3. Data synthesis and analysis

Total 47 and 12 papers, respectively, from Pubmed, and Kibase or KISS were reviewed. 39 and 4 papers were finally selected because only they focused on the prevalence among the general population. The data considering prevalence were extracted, and were compared according to the country and character of the subjects. Due to the limited character of the data, statistical analysis was not conducted.

Results

1. General characteristics of papers finally selected

A total of 39 papers conducted from 13 countries met the inclusion criteria of this study. Twenty-one studies were produced in the UK and USA while the rest were done in the Netherlands(4 papers), China(3), Brazil(2), Japan(2) and other countries(7). Thirty-three papers focused on the prevalence among the completely general population while 6 papers were for adolescents or soldiers participating in the Gulf War. Seven papers measured the prevalence of both chronic fatigue and CFS while 9 and 23 papers respectively presented the prevalence of chronic fatigue or CFS. In Korea, all four papers were for both chronic fatigue and CFS among subjects who visited clinics or took medical examination.

2. Prevalence of chronic fatigue and CFS in general population

There was a wide range of prevalence of chronic fatigue according to the countries and investigators. One study showed the lowest prevalence as 4.17% in the USA¹⁰ while another reported the highest prevalence as 30.5% in the Netherlands¹⁴. The average prevalence of chronic fatigue in the UK and USA were 11.1% and 10.4% respectively. The total

average of prevalence for chronic fatigue from 13 papers was 11.1%(Table 1).

The prevalence of CFS was very wide from 0.0004% in Australia to 3.6% in the USA^{15,16}. The average prevalences of CFS in the UK and USA were 1.1% and 1.0% respectively, and the total average of prevalence for CFS from 24 papers was 1.2%(Table 1). In particular, the CFS prevalence in

women was higher by 3–4 fold than that of men^{17, 18}.

3. Prevalence of chronic fatigue and CFS in specific groups

There were four papers focused on adolescents. In the UK, the prevalence for chronic fatigue and CFS in adolescents was 1.82% and 0.9%^{44,45} while another study showed 0.11% of CFS in the Netherlands⁴⁶.

Table 1. Prevalence of Chronic Fatigue among General Population Worldwide

Country	Author (year)	Number of subject	Prevalence (%)	
			Chronic fatigue	CFS, CFS-like(male/female)
UK	Nacul LC ¹⁷ (2011)	143,000		0.19 (0.09/0.3)
	Goodwin L ¹⁹ (2011)	11,419		1.0
	Bhui KS ²⁰ (2011)	4,281 (White vs.Pakistani)		0.8 vs.3.5
	Watanabe N ⁹ (2008)	12,792	15	
	Skapinakis P ²¹ (2003)	10,108	9	
	Skapinakis P ²² (2000)	8,026	9	
	Wessely S ²³ (1997)	2,376	11.3	0.5
	Lawrie SM ²⁴ (1995)	1,000		0.56
USA	Reeves WC ²⁵ (2007)	5,623		2.54
	Reyes M ¹⁸ (2003)	7,162		0.1 vs.0.4
	Jason LA ²⁶ (1999)	28,673		0.42
	Jason LA ¹⁰ (1999)	28,673	4.17	
	Ward MH ²⁷ (1996)	425		2.4
	Jason LA ²⁸ (1995)	1,013		0.2
	Buchwald D ²⁹ (1995)	3,066	19	2
	Bates DW ³⁰ (1993)	995	8.5	0.3
Netherlands	van't Leven M ¹⁴ (2010)	9,062	30.5	1
	Huibers MJ ¹⁶ (2004)	5,499		3.6
	Versluis RG ³¹ (1997)	2,3000		0.11
	Bazelmans E ³² (1997)	4,027		0.11
China	Wong WS ¹¹ (2010)	5,001(HongKong)	10.7	
	Yiu YM ³³ (2005)	1,013	6.4	
	Lee S ³⁴ (2000)	100		3
Japan	Hamaguchi M ³⁵ (2011)	1,430		1
	Kawakami N ³⁶ (1998)	207		1.5
Brazil	Cho HJ ³⁷ (2009)	3,914		1.6
Norway	Vistad I ³⁸ (2007)	967	13	
Germany	Martin A ³⁹ (2007)	2,412	6.1	
India	Patel V ⁴⁰ (2005)	2,494 (Woman)	12.1	
Sweden	Evengard B ⁴¹ (2005)	31,405		2.36
Iceland	Lindal E ⁴² (2002)	2,520		1.4
Israel	Buskila D ⁴³ (2001)	28,673		0.42
Australia	Lloyd AR ¹⁵ (1990)	114,000		0.0004

Three reports targeted soldiers who participated in the Gulf War. One American study showed 5.1% and 2.1% of chronic fatigue and CFS respectively⁴⁷⁾, and one British study presented 2.2% of CFS⁴⁸⁾. Another study showed a very high prevalence of CFS by 15.7%, although this was conducted using only questionnaire⁴⁹⁾(Table 2).

4. Prevalence of chronic fatigue and CFS in Korea

There were three studies that questioned for the prevalence of chronic fatigue or CFS in Korea. Two studies were done on subjects visiting the department of family medicine, and then the average prevalence of chronic fatigue or CFS was 9.9% and 0.9%^{50,51)}. Meanwhile, other two were conducted on subjects who visited hospitals for medical examination, and the average prevalence of chronic fatigue or CFS was 25.6% and 2%^{52,53)}(Table 3).

Discussion and conclusion

To identify the prevalence of chronic fatigue is critically essential and important in the process of chronic fatigue-targeting studies and therapeutic developments. This study aimed to review the current studies for the prevalence of chronic fatigue and CFS worldwide.

Since the first survey study was published at 1993 in the USA³⁰⁾, 54% of total studies have been

conducted in two countries, the US and the UK. This might indicate that these advanced countries more early realized the importance of the chronic fatigue-associated medical problems. Seven of 10 papers were published before 2000 in the US while 8 of 11 papers were reported after 2000 in the UK. 14 of the remaining 18 papers from other countries were also published after 2000, which means there is currently active and vibrant research on chronic fatigue worldwide.

According to criteria by Centers for Disease Control and Prevention(CDC) USA in 1994, chronic fatigue was defined as a symptom lasting over 6 months⁵⁴⁾. Among chronic fatigue, medically unexplained fatigue likely ICF and CFS is important in clinic⁵⁵⁾. Most published papers didn't distinguished between ICF and chronic fatigue, and the prevalence was from 4.17% to 30.5%^{10,14)}. There were gaps between countries; however total average prevalence of chronic fatigue was 11.1%. This result indicates that 10% of the general population is suffering from chronic fatigue worldwide. The prevalence among adolescents may be much lower, at only 1.82%^{44,45)}.

On the other hand, CFS is the most severe case of chronic fatigue, and there is no specific biomarker and critical factor for its diagnosis or pathogenesis⁵⁶⁾. The average prevalence of CFS was 1.2% worldwide while the most recent study(2011 year) using 143,000 subjects in the UK reported 0.19%, being 0.3% for women and 0.09% for men¹⁷⁾. In general, it

Table 2. Prevalence of Chronic Fatigue among Specific Populations Worldwide

Country	Author(year)	Subject and its Number	Prevalence (%)	
			Chronic fatigue	CFS
UK	Rimes KA ⁴⁴⁾ (2007)	Adolescent (842)	1.1	0.5
	Farmer A ⁴⁵⁾ (2004)	Adolescent (1,468)	2.34	1.29
	Reid S ⁴⁸⁾ (2001)	Gulf War veterans (3,531)		2.1
USA	McCauley LA ⁴⁷⁾ (2002)	Gulf War veterans (799)	5.1	2.2
	Kipen HM ⁴⁹⁾ (1999)	Gulf War veterans (1,161)		15.7
Netherlands	Nijhof SL ⁴⁶⁾ (2011)	Adolescent		0.11

Table 3. Main Reports for the Prevalence of Chronic Fatigue in Korea

Author (Year)	Subjects (Number)	Prevalence(%)	
		chronic fatigue	CFS
Kim CH (2005) ⁵⁰	Visitors primary care clinics (1,648)	8.4	0.6
Kim CH (2000) ⁵¹	Visitors primary care clinics (988)	11.4	1.2
Ji JD (2000) ⁵²	Hospital visitors for medical check (1,526)	29.4	2
Choi SJ (1999) ⁵³	Hospital visitors for medical check (416)	21.7	1.9

was known that the prevalence of CFS is variable according to sex, age, ethnicity and social environment. Women show a higher prevalence of CFS, about 3-fold that of men⁵⁶. One UK survey showed 4-folds higher prevalence in Pakistani(3.5%) than white (0.8%)²⁰. The average prevalence for adolescents from three papers was 0.6% compared with 1.2% for adults⁴⁴⁻⁴⁶. In contrast, soldiers who participated in the Gulf war had a very high prevalence of CFS, from 2.1% to 15.7%. This is in accordance with the previous finding that psychological stress is a causative factor of CFS⁵⁸.

There was no survey study for the prevalence of chronic fatigue and CFS among a completely general population in Korea, however four studies were done using subjects who visited clinics or took medical examination. The average prevalence of chronic fatigue and CFS was 17.7% and 1.4% respectively which are higher than foreign studies. This might mean the high prevalence among Korean in real; however it might be due to a condition related to subjects' reason for visiting clinics. Accordingly, there is a strong need for the investigation of prevalence among the general population in Korea.

The present study showed the overall features of prevalence for the chronic fatigue and CFS in the general population. The big differences in prevalence of chronic fatigue appeared depending on the countries or subjects studied. The accurate prevalence of chronic fatigue is not fully clarified to date, but about 10% of the population may complain of chronic fatigue and 1% of the general population

may suffer from CFS worldwide.

The high prevalence of chronic fatigue provides Korean medicine a potential treatment for these disorders. This study would be helpful information for development of Korean medicine targeting chronic fatigue-related diseases in the future.

Acknowledgements

This study was supported by a grant from the Oriental Medicine R&D Project, Ministry of Health & Welfare(B100045), Republic of Korea.

References

1. Sekiya N, Shimada Y, Shintani T, Tahara E, Kouta K, Shibahara N, *et al.* Reduction of perception of chronic fatigue in an observational study of patients receiving 12 weeks of *Kampo* therapy. *Journal of Alternative and Complementary Medicine*. 2005; 11(5):895-901.
2. Reynolds KJ, Vernon SD, Bouchery E, Reeves WC. The economic impact of chronic fatigue syndrome. *Cost Eff Resour Alloc*. 2004;2(1):4.
3. Sekiya N, Shimada Y, Shintani T, Tahara E, Kouta K, Shibahara N, *et al.* Reduction of perception of chronic fatigue in an observational study of patients receiving 12 weeks of *Kampo* therapy. *J Alternative and Complementary Medicine*. 2005; 11(5):895-901.

4. Jorgensen R. Chronic fatigue: an evolutionary concept analysis. *J Adv Nurs*. 2008;63(2):199-207.
5. Adams D, Wu T, Yang XS, Yang X, Tai S, Vohra S. Traditional Chinese medicinal herbs for the treatment of idiopathic chronic fatigue and chronic fatigue syndrome. *Cochrane Database Syst Rev*. 2009:CD006348.
6. Kim CH, Shin HC. Clinic for chronic fatigue. *J Korean Acad Fam Med*. 1998;19(8):592-603.
7. Yoo SR, Son CG. Survey Analysis of 101 Subjects Using Herbal Medicine with Deer Antler. *J Korean Oriental Med*. 2008;29(2):41-6.
8. Cho JH, Son CG. Need for Development of Oriental Medicine-derived Systemic Treatments against Chronic Fatigue-associated Symptoms. *J Korean Oriental Med* 2009;30(4):28-36.
9. Watanabe N, Stewart R, Jenkins R, Bhugra DK, Furukawa TA. The epidemiology of chronic fatigue, physical illness, and symptoms of common mental disorders: a cross-sectional survey from the second British National Survey of Psychiatric Morbidity. *J Psychosom Res*. 2008;64(4):357-62.
10. Jason LA, Jordan KM, Richman JA, Rademaker AW, Huang CF, McCready W, *et al*. A Community-based Study of Prolonged Fatigue and Chronic Fatigue. *J Health Psychol*. 1999;4(1):9-26.
11. Wong WS, Fielding R. Prevalence of chronic fatigue among Chinese adults in Hong Kong: a population-based study. *J Affect Disord*. 2010;127:248-56.
12. Kim CH, Shin HC, Won CW. Prevalence of chronic fatigue and chronic fatigue syndrome in Korea: community-based primary care study. *J Korean Med Sci*. 2005;20(4):529-34.
13. Health Insurance Review and Assessment Service (HIRA). Analysis on Policy: Medical care expenses for chronic fatigue syndrome. 2009;11:61-66.
14. van't Leven M, Zielhuis GA, van der Meer JW, Verbeek AL, Bleijenberg G. Fatigue and chronic fatigue syndrome-like complaints in the general population. *Eur J Public Health*. 2010;20(3):251-7.
15. Lloyd AR, Hickie I, Boughton CR, Spencer O, Wakefield D. Prevalence of chronic fatigue syndrome in an Australian population. *Med J Aust*. 1990;153(9):522-8.
16. Huibers MJ, Kant IJ, Swaen GM, Kasl SV. Prevalence of chronic fatigue syndrome-like caseness in the working population: results from the Maastricht cohort study. *Occup Environ Med*. 2004;61(5):464-6.
17. Nacul LC, Lacerda EM, Pheby D, Campion P, Molokhia M, Fayyaz S, *et al*. Prevalence of myalgic encephalomyelitis/chronic fatigue syndrome (ME/CFS) in three regions of England: a repeated cross-sectional study in primary care. *BMC Med*. 2011;9:91.
18. Reyes M, Nisenbaum R, Hoaglin DC, Unger ER, Emmons C, Randall B, *et al*. Prevalence and incidence of chronic fatigue syndrome in Wichita, Kansas. *Arch Intern Med*. 2003;163(13):1530-6.
19. Goodwin L, White PD, Hotopf M, Stansfeld SA, Clark C. Psychopathology and physical activity as predictors of chronic fatigue syndrome in the 1958 British birth cohort: a replication study of the 1946 and 1970 birth cohorts. *Ann Epidemiol*. 2011;21(5):343-50.
20. Bhui KS, Dinos S, Ashby D, Nazroo J, Wessely S, White PD. Chronic fatigue syndrome in an ethnically diverse population: the influence of psychosocial adversity and physical inactivity. *BMC Med*. 2011;9:26.
21. Skapinakis P, Lewis G, Meltzer H. Clarifying the relationship between unexplained chronic fatigue and psychiatric morbidity: results from a

- community survey in Great Britain. *Int Rev Psychiatry*. 2003;15(1-2):57-64.
22. Skapinakis P, Lewis G, Meltzer H. Clarifying the relationship between unexplained chronic fatigue and psychiatric morbidity: results from a community survey in Great Britain. *Am J Psychiatry*. 2000;157(9):1492-8.
 23. Wessely S, Chalder T, Hirsch S, Wallace P, Wright D. The prevalence and morbidity of chronic fatigue and chronic fatigue syndrome: a prospective primary care study. *Am J Public Health*. 1997;87(9):1449-55.
 24. Lawrie SM, Pelosi AJ. Chronic fatigue syndrome in the community. Prevalence and associations. *Br J Psychiatry*. 1995;166(6):793-7.
 25. Reeves WC, Jones JF, Maloney E, Heim C, Hoaglin DC, Boneva RS, *et al*. Prevalence of chronic fatigue syndrome in metropolitan, urban, and rural Georgia. *Popul Health Metr*. 2007;5:5.
 26. Jason LA, Richman JA, Rademaker AW, Jordan KM, Plioplys AV, Taylor RR, *et al*. A community-based study of chronic fatigue syndrome. *Arch Intern Med*. 1999;159(18):2129-37.
 27. Ward MH, DeLisle H, Shores JH, Slocum PC, Foresman BH. Chronic fatigue complaints in primary care: incidence and diagnostic patterns. *J Am Osteopath Assoc*. 1996;96(1):34-46.
 28. Jason LA, Taylor R, Wagner L, Holden J, Ferrari JR, Plioplys AV, *et al*. Estimating rates of chronic fatigue syndrome from a community-based sample: a pilot study. *Am J Community Psychol*. 1995;23(4):557-68
 29. Buchwald D, Umali P, Umali J, Kith P, Pearlman T, Komaroff AL. Chronic fatigue and the chronic fatigue syndrome: prevalence in a Pacific Northwest health care system. *Ann Intern Med*. 1995;123(2):81-8.
 30. Bates DW, Schmitt W, Buchwald D, Ware NC, Lee J, Thoyer E, *et al*. Prevalence of fatigue and chronic fatigue syndrome in a primary care practice. *Arch Intern Med*. 1993;153(24):2759-65.
 31. Versluis RG, de Waal MW, Opmeer C, Petri H, Springer MP. Prevalence of chronic fatigue syndrome in 4 family practices in Leiden. *Ned Tijdschr Geneeskd*. 1997;141(31):1523-6.
 32. Bazelmans E, Vercoulen JH, Galama JM, van Weel C, van der Meer JW, Bleijenberg G. Prevalence of chronic fatigue syndrome and primary fibromyalgia syndrome in The Netherlands. *Ned Tijdschr Geneeskd*. 1997;141(31):1520-3.
 33. Yiu YM, Qiu MY. A preliminary epidemiological study and discussion on traditional Chinese medicine pathogenesis of chronic fatigue syndrome in Hong Kong. *Zhong Xi Yi Jie He Xue Bao*. 2005;3(5):359-62.
 34. Lee S, Yu H, Wing Y, Chan C, Lee AM, Lee DT, *et al*. Psychiatric morbidity and illness experience of primary care patients with chronic fatigue in Hong Kong. *Am J Psychiatry*. 2000;157(3):380-4.
 35. Hamaguchi M, Kawahito Y, Takeda N, Kato T, Kojima T. Characteristics of chronic fatigue syndrome in a Japanese community population: chronic fatigue syndrome in Japan. *Clin Rheumatol*. 2011;30(7):895-906.
 36. Kawakami N, Iwata N, Fujihara S, Kitamura T. Prevalence of chronic fatigue syndrome in a community population in Japan. *Tohoku J Exp Med*. 1998;186(1):33-41.
 37. Cho HJ, Menezes PR, Hotopf M, Bhugra D, Wessely S. Comparative epidemiology of chronic fatigue syndrome in Brazilian and British primary care: prevalence and recognition. *Br J Psychiatry*. 2009;194(2):117-22.
 38. Vistad I, Fossa SD, Kristensen GB, Dahl AA. Chronic fatigue and its correlates in long-term survivors of cervical cancer treated with

- radiotherapy. *BJOG*. 2007;114(9):1150-8.
39. Martin A, Chalder T, Rief W, Braehler E. The relationship between chronic fatigue and somatization syndrome: a general population survey. *J Psychosom Res*. 2007;63(2):147-56.
 40. Patel V, Kirkwood BR, Weiss H, Pednekar S, Fernandes J, Pereira B, *et al*. Chronic fatigue in developing countries: population-based survey of women in India. *BMJ*. 2005;330.
 41. Evengard B, Jacks A, Pedersen NL, Sullivan PF. The epidemiology of chronic fatigue in the Swedish Twin Registry. *Psychol Med*. 2005;35(9):1317-26.
 42. Lindal E, Stefansson JG, Bergmann S. The prevalence of chronic fatigue syndrome in Iceland - a national comparison by gender drawing on four different criteria. *Nord J Psychiatry*. 2002;56(4):273-7.
 43. Buskila D. Fibromyalgia, chronic fatigue syndrome, and myofascial pain syndrome. *Curr Opin Rheumatol*. 2001;13(2):117-27.
 44. Rimes KA, Goodman R, Hotopf M, Wessely S, Meltzer H, Chalder T. Incidence, prognosis, and risk factors for fatigue and chronic fatigue syndrome in adolescents: a prospective community study. *Pediatrics*. 2007;119(3):e603-9.
 45. Farmer A, Fowler T, Scourfield J, Thapar A. Prevalence of chronic disabling fatigue in children and adolescents. *Br J Psychiatry*. 2004;184:477-81.
 46. Nijhof SL, Majjer K, Bleijenberg G, Uiterwaal CS, Kimpfen JL, van de Putte EM. Adolescent chronic fatigue syndrome: prevalence, incidence, and morbidity. *Pediatrics*. 2011;127(5):e1169-75.
 47. McCauley LA, Joos SK, Barkhuizen A, Shuell T, Tyree WA, Bourdette DN. Chronic fatigue in a population-based study of Gulf War veterans. *Arch Environ Health*. 2002;57(4):340-8.
 48. Reid S, Hotopf M, Hull L, Ismail K, Unwin C, Wessely S. Multiple chemical sensitivity and chronic fatigue syndrome in British Gulf War veterans. *Am J Epidemiol*. 2001;153(6):604-9.
 49. Kipen HM, Hallman W, Kang H, Fiedler N, Natelson BH. Prevalence of chronic fatigue and chemical sensitivities in Gulf Registry Veterans. *Arch Environ Health*. 1999;54(5):313-8.
 50. Kim CH, Shin HC, Won CW. Prevalence of chronic fatigue and chronic fatigue syndrome in Korea: community-based primary care study. *J Korean Med Sci*. 2005;20(4):529-34.
 51. Kim CH, Shin HC, Park YW. The prevalence of chronic fatigue and CFS-a hospital based study. *J Korean Acad Fam Med*. 2000;21:1288-98.
 52. Ji JD, Chun BC, Choi YS, Choi SJ, Lee YH, Song GG. The prevalence and clinical manifestations of chronic fatigue syndrome in persons who visited health management center. *KJIM*. 2000;59(5):529-34.
 53. Choi SJ, Ji JD, Lee YH, Song GG. Incidence and clinical manifestations of chronic fatigue in Korea. *KJIM*. 1999;56(6):738-44.
 54. Holmes GP, Kaplan JE, Gantz NM, Komaroff AL, Schonberger LB, Straus SE, *et al*. Chronic fatigue syndrome: a working case definition. *Ann Intern Med*. 1988;108:387-9.
 55. Fukuda K, Straus SE, Hickie I, Sharpe MC, Dobbins JG, Komaroff A. International chronic fatigue syndrome study group. The chronic fatigue syndrome: a comprehensive approach to its definition and study. *Ann Intern Med*. 1994;121:953-9.
 56. Griffith JP, Zarrouf FA. A Systematic Review of Chronic Fatigue Syndrome: Don't Assume It's Depression. *Prim Care Companion J Clin Psychiatry*. 2008;10(2):120-8.
 57. Wyller VB. The chronic fatigue syndrome - an update. *Acta Neurol Scand Suppl*. 2007;187:7-14.
 58. Peckerman A, LaManca JJ, Qureishi B, Dahl KA, Golfetti R, Yamamoto Y, *et al*. Baroreceptor

reflex and integrative stress responses in chronic fatigue syndrome. *Psychosom Med.* 2003;65(5): 889-95.