



Different levels of awareness and knowledge of male climacteric in female nurses and female office workers



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ABSTRACT

Objective: The objective of this study was to examine levels of awareness and knowledge regarding male climacteric or andropause in Japanese women. We also examined whether there are differences in these levels between nurses as a health profession group and office workers as a general population group.

Methods: Two thousand and eight hundred female registered nurses and women with office-related general occupations aged 20–65 years in Japan completed health questionnaires regarding awareness and knowledge of male climacteric, including male menopausal symptoms and treatments.

Results: The proportion in women who had heard of the term male climacteric in nurses was significantly higher than that in office workers. Nurses with past or current experience of menopausal symptoms were likely to recognize male climacteric. Nurses also had a higher level of knowledge than did office workers regarding male menopausal symptoms. High proportions of both nurses and office workers acknowledged depressed mood, irritability, nervousness and sleep problems as male menopausal symptoms. The proportions of women with sympathy for men with male climacteric were high in women with experience of past or current menopausal symptoms and in women who were close to men who suffered from menopausal symptoms.

Conclusions: Nurses with past or current experience of menopausal symptoms had high levels of awareness and knowledge of male climacteric. To spread more information and knowledge regarding male climacteric, provision of education for these nurses may be needed.

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1. Introduction

Decrease in testosterone levels induces various symptoms including sexual dysfunction, cognitive impairment, decreased energy, depressed mood, increased fat mass and muscle weakness [1]. Various terms including partial androgen decline in aging males (PADAM), male climacteric, andropause and late onset hypogonadism (LOH) have been used for symptoms induced by decrease in testosterone levels [2]. According to a recently formulated definition, LOH is characterized by the presence of any of the typical signs or symptoms of LOH and a deficiency in serum testosterone levels [3].

Although terms such as male climacteric, andropause and LOH have been used in the medical science society [2,3], there is insufficient awareness and knowledge regarding these terms by the

general public. It has been reported that 65–79% of the subjects in previous studies had heard of the term andropause or male climacteric [4–6]. However, it has been reported that 45.1% of men had no knowledge of andropause in Nigeria [7] and that awareness of andropause was found in only 2.2% of men in north India [8]. Levels of awareness and knowledge regarding these terms may vary among countries depending on cultural and environmental factors. In Japan, reports on andropause or LOH in the popular media have been increasing [9] and the Japanese Aging Male Questionnaire as a screening tool for LOH was developed [10]. Recently, Murai et al. reported that 56% of 50 men had heard of the term andropause or male menopause [11]. However, to the best of our knowledge, there have been very few studies of awareness and knowledge regarding male climacteric, andropause and LOH in Japan.

Awareness and knowledge regarding male climacteric, andropause and LOH may be different in men and women. It has been reported that a high proportion of women had good knowledge of andropause [11,12]. Fatusi et al. suggested that women come to terms with declining libido and sexual

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performance with age, while men are struggling with these issues [12]. The gender difference may be because women do not consider male climacteric, andropause or LOH as a strange condition since women sufficiently recognize menopausal symptoms. Although education of male climacteric, andropause or LOH for men is important, increases in the levels of awareness and knowledge for women are also needed in order to be widely recognized socially. In addition, women who have experienced menopausal symptoms may be likely to accept male climacteric.

Study to determine appropriate subjects to receive education about male climacteric is important to spread the awareness and knowledge of male climacteric in society. Health care professionals may be candidates for such subjects since they have knowledge about the physiology of men. Pommerville et al. reported that primary care physicians had high levels of awareness and knowledge about andropause [13]. It has been reported that doctors and primary care physicians agreed that men experience something similar to women's menopause [13,14]. Nurses, who have medical knowledge, are likely to have a better understanding of andropause than the general population.

Therefore, we examined the levels of awareness and knowledge regarding male climacteric or andropause in Japanese women. We also examined whether there are differences in these levels between nurses as a health profession group and office workers as a general population group.

2. Subjects and methods

This study was conducted from December in 2013 to February in 2014. We asked national, public and private hospitals in Shikoku Island in Japan whether cooperation for our research is possible in advance and invited nurses in 7 national and public hospitals and one private hospital for which cooperation could be obtained. In addition, we asked municipal offices in cities, towns and villages in Shikoku Island whether cooperation for our research is possible in advance and invited office workers in 8 municipal offices for which cooperation could be obtained. A total of 1500 female registered nurses aged 20–65 years who were working in general hospitals and 1300 females with office-related general occupations aged 20–65 years in Japan completed a health questionnaire. Participants were informed of the purposes and procedure of the study in the invitation letter.

2.1. Questionnaire

We designed a self-administered questionnaire consisting of 4 parts that took about 20 min to complete.

The first part of the questionnaire consisted of questions on age, marital status (married, single, divorced or other status) and menstrual status. Menstrual status was divided into premenopause (regular menstrual cycle during the past 12 months), perimenopause (irregular menstruation during the past 12 months) and postmenopause (no menstruation during the past 12 months).

The second part consisted of questions regarding knowledge of women's menopause, including the speculated prevalence and age of occurrence of climacteric and the causes and treatments of menopausal symptoms. We also asked the participants whether they have experienced past or current menopausal symptoms. If yes, we asked whether they had received treatment for menopausal symptoms.

The third part consisted of questions regarding awareness and knowledge of male climacteric. First, we asked whether the participants had heard of the term "male climacteric". If yes, we asked about (1) the source, (2) knowledge of male climacteric, including the speculated prevalence and age of occurrence of male climacteric

and the causes of male menopausal symptoms, (3) knowledge of individual male menopausal symptoms and (4) treatment options for men with male menopausal symptoms. The Aging Males' Symptoms Scale (AMS) was used for assessment of male menopausal symptoms [15,16]. The AMS scale was originally developed and validated in Germany in 1999 and consists of 17 items of psychological, somatic and sexual symptoms. A response of "Agree", "Disagree" or "Cannot be determined" was given to the following 17 symptoms: (1) decline in feeling of general well-being, (2) joint pain and muscular ache, (3) excessive sweating, (4) sleep problems, (5) increased need for sleep, often feeling tired, (6) irritability, (7) nervousness, (8) anxiety, (9) physical exhaustion, (10) decrease in muscular strength, (11) depressive mood, (12) feeling that the man has passed his peak, (13) feeling burnt out, having hit rock-bottom, (14) decrease in beard growth, (15) decrease in ability/frequency to perform sexually, (16) decrease in the number of morning erections and (17) decrease in sexual desire/libido.

In women who had heard of male climacteric, the fourth part consisted of questions regarding the way of thinking and sympathy about male climacteric: (1) whether male menopausal symptoms should be treated and whether male climacteric symptoms influence future life, (2) what the participants recommend for men with male menopausal symptoms, (3) whether men who had suffered from male menopausal symptoms are close to you, (4) whether the participants can understand men who are suffering from male menopausal symptoms, and (5) whether the participants feel sympathy for men suffering from male menopausal symptoms.

All information was generated from self-administered yes/no responses to closed-end questions.

2.2. Ethics

The Ethics Committee of Tokushima University Hospital approved the study (number 1831).

2.3. Statistical analysis

Each categorized variable is expressed as number with percentage of proportion. Significance of differences in the levels of awareness and knowledge between nurses and office workers was evaluated by the chi-square test. With respect to the way of thinking and sympathy for men with male menopausal symptoms, we also used the chi-square test for the significance of differences in variables. All *p* values are two-tailed and those less than 0.05 were considered to be statistically significant. Statistical analyses for data evaluation were carried out using SPSS version 2.0 for Windows.

3. Results

3.1. Response

The overall response rate was 78.5% (2199/2800). We excluded 549 incomplete questionnaires with missing answers in the answer column. Complete entry in the answer column was determined as a valid response and the rate of valid responses was 75.0% (1650/2199). Questionnaires from 831 nurses and 819 office workers were used for analysis.

3.2. Background characteristics of the subjects

The mean ages of nurses and office workers were 43.5 and 44.8 years, respectively. As can be seen in Table 1, there were significant differences in the proportions of women in the generations and menstrual status between nurses and office workers. The proportion in women with past or current experience of menopausal

Table 1
Background characteristics of nurses and office workers.

		All women (n = 1650)		Nurses (n = 831)		Office workers (n = 819)		p Values
Age (years) (no, %)	20–39	503	(30.5)	267	(32.2)	236	(28.8)	0.044
	40–49	561	(34.0)	293	(35.5)	268	(32.7)	
	50–65	586	(35.5)	271	(32.6)	315	(38.4)	
Current marital status (no, %)	Married	1131	(68.5)	558	(67.1)	573	(70.0)	0.218
	Not married/others	519	(31.5)	273	(32.9)	246	(30.0)	
Menstrual status (no, %)	Premenopause	796	(48.2)	408	(49.1)	388	(47.4)	0.001
	Perimenopause	332	(20.1)	194	(23.3)	138	(16.8)	
	Postmenopause	431	(26.1)	191	(23.0)	240	(29.3)	
	Surgical menopause	91	(5.5)	38	(4.6)	53	(6.5)	
Experience with past or current menopausal symptoms (no, %)	Yes	497	(30.1)	231	(27.8)	266	(32.5)	0.038
	No	1153	(69.9)	600	(72.2)	553	(67.5)	
In women with past or current experience of menopausal symptoms (n = 497)								
Past or current treatment for menopausal symptoms (no, %)	Yes	140	(28.2)	53	(23.0)	87	(32.6)	0.018
	No	357	(71.8)	177	(77.0)	180	(67.4)	

p Values: nurses vs office workers.

symptoms was 30.1% in all women. The proportion of office workers with past or current experience of menopausal symptoms was significantly higher than that of nurses ($p = 0.038$). In 497 women with past or current experience of menopausal symptoms, the proportion of women who had received treatment was 28.2%. The proportion of office workers who had received treatment was also significantly higher than that of nurses ($p = 0.018$).

3.3. Awareness of male menopausal syndrome in all women

The proportion of women who had heard of male climacteric increased with advance of age ($p < 0.001$). Married women had a high level of awareness of male climacteric ($p < 0.001$). The proportion of women with past or current experience of menopausal symptoms who had heard of male climacteric was high ($p < 0.001$). There was no significant difference in the level of awareness between women who received treatment and women who did not receive treatment ($p = 0.199$).

3.4. Comparison of awareness of male menopausal syndrome by nurses and office workers

The proportion of nurses who had heard of the term male climacteric (73.5%) was significantly higher than that of office workers (68.9%) ($p = 0.039$). The proportion of nurses with past or current experience of menopausal symptoms who had heard of male climacteric was significantly higher than the proportion of office workers with past or current experience of menopausal symptoms ($p < 0.001$) (Table 2). In addition, in women with past or current experience of menopausal symptoms, the proportion of nurses who had heard of male climacteric was significantly higher than that of office workers regardless of the presence of past or current treatment. In 1175 women who had heard of male climacteric, the proportion of women who were close to men who suffered from male menopausal symptoms was 22.0%, and there was no significant difference in this proportion between nurses and office workers.

The main sources of information regarding male climacteric were magazines, newspapers, television and books for both nurses and office workers (87.6% and 85.1%, respectively). The second main sources were medical institutions for nurses (27.7%) and acquaintances for office workers (13.1%) (multiple answer allowed).

3.5. Comparison of knowledge regarding male and female climacteric

The largest number of responses regarding the speculated prevalence rate of male menopausal symptoms was 25% followed by 50% in both nurses and office workers, while the largest number of responses regarding the speculated prevalence rate of female menopausal symptoms was 75% followed by 50% in both nurses and office workers (Table 3). The largest number of responses regarding the ages of occurrence of both male and female climacteric was 50–59 years followed by 40–49 years in both nurses and office workers. The ratio of responses for age of occurrence of female climacteric was significantly different between nurses and office workers. The largest number of responses as a cause of male menopausal symptoms was androgen deficiency followed by psychological and social factors in both nurses and office workers. The ratio of responses for personality in nurses was significantly higher than that in office workers. Most of the nurses (97.8%) and office workers (97.3%) stated estrogen deficiency as a cause of menopausal symptoms in women. The ratio of responses for personality was higher in nurses, while the ratio of responses for genetic factors was higher in office workers.

3.6. Comparison of knowledge regarding male menopausal symptoms

As can be seen in Table 4, for 13 of the 17 symptoms, the proportions of nurses who agreed with these symptoms as male menopausal symptoms were significantly higher than those of office workers. In nurses, the proportions of subjects who agreed with depressed mood (88.7%), irritability (86.4%) and nervousness (81.0%) as male menopausal symptoms were high. In office workers, the proportions of subjects who agreed with depressed mood (83.3%), irritability (78.2%), nervousness (73.8%) and sleep problems (73.6%) as male menopausal symptoms were also high. On the other hand, the proportions of women who agreed with decrease in ability to perform sexuality, decrease in the number of morning erections and decrease in sexual desire as male menopausal symptoms were relatively low in both nurses and office workers. The response rate of “cannot be determined” in office workers was higher than that in nurses.

Table 2
Comparison of levels of awareness of male climacteric in nurses and office workers.

		Nurses (n = 831)		Office workers (n = 819)		p Value
		Aware	Not aware	Aware	Not aware	
Age (years) (no, %)	20–39	142 (53.2)	125 (46.8)	110 (46.6)	126 (53.4)	0.141
	40–49	243 (82.9)	50 (17.1)	210 (78.4)	58 (21.6)	0.170
	50–65	226 (83.4)	45 (16.6)	244 (77.5)	71 (22.5)	0.072
Marital status (no, %)	Married	443 (79.4)	115 (20.6)	431 (75.2)	142 (24.8)	0.094
	Not married/others	168 (61.5)	105 (38.5)	133 (54.1)	113 (45.9)	0.085
Experience with past or current menopausal symptoms (no, %)	Yes	211 (91.3)	20 (8.7)	213 (80.1)	53 (19.9)	<0.001
	No	400 (66.7)	200 (33.3)	351 (63.5)	202 (36.5)	0.283
In women with past or current experience of menopausal symptoms (n = 497)						
Past or current treatment (no, %)	Yes	51 (96.2)	2 (3.8)	73 (83.9)	14 (16.1)	0.026
	No	159 (89.8)	18 (10.2)	140 (77.8)	40 (22.2)	0.002
In women who had heard of male climacteric (n = 1175)						
Men who had suffered from male menopausal symptoms are close to you (no, %)	Yes	135 (22.1)		124 (22.0)		0.964
	No	476 (77.9)		440 (78.0)		

3.7. Comparison of knowledge regarding treatment options for male menopausal symptoms

With regard to all treatment options, the proportions of nurses who agreed were significantly higher than those of office workers (Table 5). The proportions of women who agreed with counseling as treatment were high in both nurses and office workers. In addition, high proportions of women agreed that hormone treatment and herbal medicines are treatments for male menopausal symptoms. However, the proportion of women who believed that drugs for erectile dysfunction are treatment for male

menopausal symptoms was low. The response rate of “cannot be determined” in office workers was also higher than that in nurses.

3.8. Comparison of way of thinking for men with male menopausal symptoms

As can be seen in Table 6, the way of thinking regarding management for men with menopausal symptoms was significantly different between nurses and office workers (p = 0.02): 84.1% of nurses and 77.3% of office workers indicated that they would recommend men with male menopausal symptoms to consult

Table 3
Comparison of levels of knowledge regarding female and male climacteric.

			Nurses		Office workers		p Value	
Female climacteric (n = 1650)	Speculated prevalence (no, %)	0%	1	(0.1)	2	(0.2)	0.626	
		25%	55	(6.6)	69	(8.4)		
		50%	297	(35.7)	289	(35.3)		
		75%	422	(50.8)	400	(48.8)		
		100%	56	(6.7)	59	(7.2)		
	Age of occurrence (years) (no, %)	30–39	10	(1.2)	4	(0.5)	0.047	
		40–49	310	(37.3)	263	(32.1)		
		50–59	505	(60.8)	545	(66.5)		
		60–69	6	(0.7)	7	(0.9)		
	Causes (No, %)	Hormone deficiency	Yes	813	(97.8)	797	(97.3)	0.492
			No	18	(2.2)	22	(2.7)	
		Psycho-social factors	Yes	443	(53.3)	410	(50.1)	0.187
			No	388	(46.7)	409	(49.9)	
Personality		Yes	291	(35.0)	168	(20.5)	<0.001	
		No	540	(65.0)	651	(79.5)		
Genetic factor		Yes	62	(7.5)	85	(10.4)	0.038	
		No	769	(92.5)	734	(89.6)		
Male climacteric (n = 1175)	Speculated prevalence (no, %)	0%	1	(0.2)	7	(1.2)	0.131	
		25%	336	(55.0)	326	(57.8)		
		50%	240	(39.3)	197	(34.9)		
		75%	26	(4.3)	25	(4.4)		
		100%	8	(1.1)	9	(1.6)		
	Age of occurrence (years) (no, %)	30–39	2	(0.3)	1	(0.2)	0.780	
		40–49	114	(18.7)	94	(16.7)		
		50–59	439	(71.9)	415	(73.6)		
		60–69	56	(9.2)	54	(9.6)		
	Causes (no, %)	Hormone deficiency	Yes	534	(87.4)	497	(88.1)	0.706
			No	77	(12.6)	67	(11.9)	
		Psycho-social factors	Yes	510	(83.5)	448	(79.4)	0.075
			No	101	(16.5)	116	(20.6)	
Personality		Yes	245	(40.1)	122	(21.6)	<0.001	
		No	366	(59.9)	442	(78.4)		
Genetic factor		Yes	50	(8.2)	38	(6.7)	0.347	
		No	561	91.8	526	(93.3)		

Table 4
Comparison of levels of knowledge regarding male menopausal symptoms.

		Nurses			Office workers			p Value
		Agree	Disagree	Cannot be determined	Agree	Disagree	Cannot be determined	
1.	Decline in feeling of general well-being	439(71.8)	56(9.2)	116(19.0)	333(59.0)	67(11.9)	164(29.1)	<0.001
2.	Joint pain and muscular ache	136(22.2)	254(41.6)	221(36.2)	128(22.7)	185(32.8)	251(44.5)	0.004
3.	Excessive sweating	420(68.7)	53(8.7)	138(22.6)	401(71.1)	32(5.7)	131(23.2)	0.140
4.	Sleep problems	486(79.6)	38(6.2)	87(14.2)	415(73.6)	27(4.8)	122(21.6)	0.003
5.	Increased need for sleep, often feeling tired	428(70.0)	75(12.3)	108(17.7)	360(63.8)	69(12.2)	135(23.9)	0.027
6.	Irritability	528(86.4)	20(3.3)	63(10.3)	441(78.2)	24(4.3)	99(17.6)	0.001
7.	Nervousness	495(81.0)	35(5.7)	81(13.3)	416(73.8)	35(6.2)	113(20.0)	0.006
8.	Anxiety	398(65.1)	73(12.0)	140(22.9)	349(61.9)	59(10.5)	156(27.7)	0.158
9.	Physical exhaustion	459(75.1)	59(9.7)	93(15.2)	376(66.7)	69(12.2)	119(21.1)	0.006
10.	Decrease in muscular strength	208(34.0)	208(34.0)	195(32.0)	193(34.2)	167(29.6)	204(36.2)	0.185
11.	Depressive mood	542(88.7)	14(2.3)	55(9.0)	470(83.3)	18(3.2)	76(13.5)	0.028
12.	Feeling that the man has passed his peak	369(60.4)	84(13.7)	158(25.9)	277(49.1)	111(19.7)	176(31.2)	<0.001
13.	Feeling burnout, having hit rock-bottom	456(74.6)	37(6.1)	118(19.3)	366(64.9)	56(9.9)	142(25.2)	0.001
14.	Decrease in beard growth	163(26.7)	168(27.5)	280(45.8)	101(17.9)	175(31.0)	288(51.1)	0.002
15.	Decrease in ability/frequency to perform sexuality	327(53.5)	104(17.0)	180(29.5)	219(38.8)	113(20.0)	232(41.1)	<0.001
16.	Decrease in the number of morning erections	289(47.3)	109(17.8)	213(34.9)	191(33.9)	105(18.6)	268(47.5)	<0.001
17.	Decrease in sexual desire/libido	332(54.3)	95(15.5)	184(30.2)	215(38.2)	94(16.7)	255(45.2)	<0.001

Number (%).

Table 5
Comparison of levels of knowledge regarding treatment options for male menopausal symptoms.

	Nurses			Office workers			p Value
	Agree	Disagree	Cannot be determined	Agree	Disagree	Cannot be determined	
Hormone treatment	496(81.2)	23(3.8)	92(15.1)	427(75.7)	13(2.3)	124(22.0)	0.004
Herbal medicines	483(79.1)	21(3.4)	107(17.5)	394(69.9)	33(5.9)	137(24.3)	0.001
Anti-depressant drugs	380(62.2)	59(9.7)	172(28.2)	309(54.8)	61(10.8)	194(34.4)	0.033
Drugs for erectile dysfunction	142(23.2)	200(32.7)	269(44.0)	82(14.6)	189(33.6)	293(51.9)	<0.001
Counseling	562(92.0)	8(1.3)	41(6.7)	467(82.8)	11(2.0)	86(15.2)	<0.001

Number (%).

with doctors, while 10.3% of nurses and 15.1% of office workers responded the male menopausal symptoms would be resolved in due course of time.

3.9. Sympathy for men with male menopausal symptoms

The proportion of women who feel sympathy for men with male menopausal symptoms was 66.5% in all women. As can be seen in [Table 7](#), there was no significant difference in the proportions between nurses and office workers. Women with experience of past or current menopausal symptoms and women who were close to men who suffered from male menopausal symptoms had significantly higher levels of sympathy. Married women also had a high level of sympathy.

Table 6
Comparison of the way of thinking for men with male menopausal symptoms.

		Nurses (n=611)	Office workers (n=564)	p Values
Change in life style improves male menopausal symptoms	Agree	581(95.1)	535(94.9)	0.856
	Disagree	30(4.9)	29(5.1)	
Management for men with menopausal symptoms	Recommend to doctors	514(84.1)	436(77.3)	0.02
	Counsel that condition is self-limiting and it will resolved in due course of time	63(10.3)	85(15.1)	
	Advise patients to seek alternative therapy	20(3.3)	30(5.3)	
	Tell that patient condition has no treatment	14(2.3)	13(2.3)	
Male menopausal symptoms influence future life	Agree	566(92.6)	510(90.4)	0.173
	Disagree	45(7.4)	54(9.6)	

Number (%).

4. Discussion

In the present study, the proportions of women who had heard of the term male climacteric were 68–73%. To date, the focus has been on men as respondents regarding awareness and knowledge of male climacteric and andropause, and there have been few studies focusing on women as respondents. It has been reported that 42–56% of women responded that they had previous awareness regarding andropause or male climacteric [11,12]. In addition, 28.4% of women in that study had good knowledge regarding andropause, the proportion being significantly higher than that of men [12]. The rate of awareness of male climacteric in our study was high compared to the rates of awareness in previous studies.

Anderson et al. reported that health care professional callers and general public callers had similar levels of knowledge

Table 7
Sympathy for men with male menopausal symptoms.

		Sympathize (n = 785)		Do not sympathize (n = 37)		Cannot be determined (n = 358)		p Value
Occupation (no, %)	Nurse	392	(63.9)	21	(3.4)	200	(32.6)	0.148
	Office workers	393	(69.3)	16	(2.8)	158	(27.9)	
Age (years) (no, %)	20–39	154	(60.9)	8	(3.2)	91	(35.9)	0.204
	40–49	305	(67.0)	12	(2.6)	138	(30.3)	
	50–65	326	(69.1)	17	(3.6)	129	(39.5)	
Marital status (no, %)	Married	612	(69.7)	28	(3.2)	238	(27.1)	<0.001
	Not married/others	173	(57.3)	9	(3.0)	120	(39.7)	
Experience of past or current menopausal symptoms (no, %)	Yes	318	(74.9)	12	(2.8)	94	(22.2)	<0.001
	No	467	(61.8)	25	(3.3)	264	(34.8)	
Men who had suffered from male menopausal symptoms are close to you (no, %)	Yes	192	(74.1)	14	(5.4)	53	(20.5)	<0.001
	No	593	(64.4)	23	(2.5)	305	(33.1)	

regarding andropause and treatment of hypogonadism [6]. However, we showed that nurses were likely to have a high level of awareness compared to that of office workers. In addition, nurses had a higher level of knowledge regarding male menopausal symptoms and a lower response rate of “cannot be determined” than those in office workers. The reason might be education regarding male climacteric for nurses in university classes.

It has been demonstrated that mass media was the main source of andropause information [4]. Anderson et al. reported that the most frequently cited clinical source was primary care physicians, while the most frequently cited non-clinical source of health-related information was the Internet [6]. In the present study, we showed that the second most frequent source was medical institutions following mass media for nurses, suggesting that accurate information from medical institutions as a clinical source is important.

Women with past or current experience of menopausal symptoms, particularly nurses, were likely to have a high level of awareness of male climacteric. Experience of menopausal symptoms in women may be associated with awareness of male climacteric. Awareness of male climacteric increased with advance of age, suggesting that middle-aged women are likely to accept the concept of male climacteric. However, Fatusi et al. reported that younger subjects aged less than 40 years had a better level of awareness than did older subjects aged more than 40 years [12]. The different results may be due to gender difference since the subjects in the previous study included 50.8% men and 49.2% women. Taher et al. reported that married men were likely to accept symptoms of andropause, suggesting that married men are more tolerant to their conditions than are widowers since they can share their feelings with their spouses [17]. We showed that married women were likely to have heard of male climacteric in both nurses and office workers. Married women were also likely to feel sympathy for men with male menopausal symptoms and accept the concept of male climacteric.

We found that the proportions of women who considered symptoms such as decreases in beard growth, joint pain, muscle strength, libido and sexual ability as male menopausal symptoms were low, and psychological symptoms were considered to be the main male menopausal symptoms. LOH is accompanied by a number of symptoms including loss of muscle strength and bone density, decrease in libido, memory, enjoyment of life and mood as well as impotence, asthenia and cognitive dysfunction [18]. The spread of knowledge that somatic and sexual symptoms are included in male menopausal symptoms as LOH is needed in Japan.

Fatusi et al. reported that 90% of respondents recommended men with male menopausal symptoms to qualified doctors for management, although 4.5% believed that the condition has no effective solution or is self-limiting in nature [12]. We found that

nurses believed that male menopausal symptoms should be positively treated by doctors. With respect to treatment options, many nurses and office workers believed that counseling is a useful treatment. In addition, the response rates for hormone treatment and herbal medicines were high. The way of thinking regarding treatments for male menopausal symptoms varies depending on the country. It has been reported that more than 90% of general public callers knew that a low level of testosterone is treatable with medication and that 63% had received testosterone replacement therapy (TRT) [6]. However, it has been reported that only 3–11% of men had an idea regarding treatment of andropause or male climacteric symptoms in Sweden and north India [5,8] and that the proportion of subjects who had received TRT was only 6.6% [8]. It is well documented that the use of TRT for andropause has been addressed in treatment guidance [19]. It has been reported that the number of testosterone prescriptions has been increasing in recent years, suggesting that physicians are becoming more familiar with the concept of andropause or LOH [6]. In Japan, herbal medicines have been used for many years to adjust clinical conditions in men. Tsujimura et al. suggested that herbal medicines are options for treatment of men with testosterone deficiency syndrome [20]. Therefore, the proportion of men receiving treatment with herbal medicines might be as high as the proportion of men receiving hormone therapy. Recognition that sexual dysfunction is one of the male menopausal symptoms may be low in Japanese women because of the low proportion of women who believe that drugs for erectile dysfunction are treatment for male climacteric. Spread of knowledge regarding treatment options for male climacteric may be needed.

In the present study, the levels of awareness of male menopausal symptoms and female menopausal symptoms were different in women. The speculated prevalence rate of male menopausal symptoms was 25%, while that of female menopausal symptoms was 75%. The prevalence of primary, secondary and compensated hypogonadism was 23.3% in men aged 40 to 79 years [21] and the incidence of hypogonadal testosterone level increased to about 20% in men over 60 years of age [22]. In addition, women believed that psychosocial factors as well as androgen deficiency are causes of male climacteric, while women believed estrogen deficiency to be the main cause of female climacteric. Both nurses and office workers may consider causes of male climacteric and female climacteric to be basically different. However, they believe that male climacteric affects quality of life for men as much as female climacteric does for women. Testosterone deficiency has been shown to be associated with reduced muscle mass, low bone density, insulin resistance and occurrence of metabolic syndrome as well as decrease in energy, mood, erectile function and libido [23,24]. More recently, it has been reported that severe LOH was associated with substantially higher risks of all-cause and cardiovascular

mortality [25]. Therefore, an understanding of testosterone deficiency as a cause of male climacteric is important.

We found that women with past or current experience of menopausal symptoms and women who were close to men who suffered from male menopausal symptoms were likely to feel sympathy for male climacteric. A feeling of sympathy for men with male climacteric as well as knowledge of the condition may be important to understand male climacteric.

Awareness and knowledge of male climacteric in nurses was satisfactory to a certain extent, but these levels are not high. Appropriate education may be useful for popularization of male climacteric. Andropause could be accepted as an important health problem of men much in the same way that menopause has been accepted as a major health problem of women. For climacteric women, Senba et al. reported that a health educational program induced change in cognitive actions of climacteric women, resulting in improvement of menopausal symptoms [26]. Therefore, establishment of an educational program for male climacteric, andropause and LOH is strongly desired.

There are some limitations that should be taken into account when considering the results of this study. First, some of background characteristics were different between nurses and office workers. The differences should be considered in interpretation of the results. Second, educational level may influence awareness and knowledge of male climacteric. In Japan, registered nurses were educated equally, but educational levels in office workers might be different. Third, we used the terms “male climacteric” and “andropause” so that the respondents could answer easily. However, it has been addressed that LOH is a clinical and biochemical syndrome associated with advancing age [2]. Therefore, a questionnaire regarding the term “LOH” might be needed. Finally, the respondents were all women. Further study on differences between men and women in awareness and knowledge regarding LOH may be needed.

5. Conclusion

Nurses with past or current experience of menopausal symptoms had high levels of awareness and knowledge of male climacteric. In addition, women with experience of past or current menopausal symptoms and women who were close to men who suffered from male menopausal symptoms were likely to feel sympathy for men with male menopausal symptoms. To spread more information and knowledge regarding male climacteric, andropause and LOH, provision of education for these women may be needed.

Ethical approval

The Ethics Committee of Tokushima University Hospital approved the study (number 1831).

Contributors

Authors (Ayako Kino and Toshiyuki Yasui) contributed to the design of the study, collected the data and commented on the first draft of the paper. Authors (Ayako Kino and Hirokazu Uemura) analyzed data. All authors (Ayako Kino, Hirokazu Uemura and Toshiyuki Yasui) contributed to the final version of the paper, had full access to the data, and take responsibility for the integrity of the data and the accuracy of the data analysis.

Ayako Kino and Toshiyuki Yasui contributed to the design of the study, collected the data and commented on the first draft of the paper. Ayako Kino and Hirokazu Uemura analyzed the data. All authors reviewed the final version of the manuscript.

Competing interest

None.

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None.

Conflict of interest statement

The authors declare that there is no conflict of interest for this work.

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