

Women's Awareness of Ovarian Cancer Risk Factors and Symptoms in Western Iran in 2020-2021

Maryam Babaei

Shahid Beheshti University of Medical Sciences

Fatemeh Salmani

Birjand University of Medical Sciences

Nourossadat Kariman

Shahid Beheshti University of Medical Sciences

Saeideh Nasiri

Kashan University of Medical Sciences

Giti Ozgoli (✉ gitiozgoli2017@gmail.com)

Shahid Beheshti University of Medical Sciences

Research Article

Keywords: Awareness, Ovarian neoplasms, Risk factors, Women, and Symptoms

Posted Date: March 9th, 2022

DOI: <https://doi.org/10.21203/rs.3.rs-1353863/v2>

License:  This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Abstract

Objectives: This study aimed to investigate Iranian women's awareness of warning signs and risk factors for ovarian cancer.

Methods: This cross-sectional, descriptive study was conducted in Sanandaj and Kermanshah, Iran, in 2020 and 2021. In this study, 1081 women aged 18-70 years were selected as the sample to fill out the electronic version of the Ovarian Cancer Awareness Measure (OCAM) to identify the significant variables of ovarian cancer warning signs and risk factors. The obtained data were statistically analyzed by descriptive statistics and ordinal logistic regression in SPSS 19.

Results: In this study, 60.9% of the participants had medium awareness of the subject. The results indicated that participants with higher educational attainment ($P<0.05$) and those with a family history of cancer ($P<0.001$) showed higher knowledge of cancer. The lowest level of awareness of symptoms was associated with acute symptoms such as dysphagia (swallowing problems) most days, persistent bloating, a sense of abdominal fullness or heaviness, and frequent urination. Moreover, the lowest awareness of risk factors was related to the history of IVF treatments and the application of talcum powder to the genital area.

Conclusion: The study findings showed that Iranian women have moderate awareness of ovarian cancer and low knowledge on cancer warning signs; this suggests that it is necessary to train Iranian women in order to raise awareness of the signs and risk factors for ovarian cancer.

Introduction:

Ovarian cancer is the seventh common cancer in the world and the eighth leading cause of cancer death among women; that is why it is considered one of the deadliest cancers. This disease affected 295,414 women and took the lives of 184,799 women worldwide in 2018. The most recent estimates reveal that the number of new cases of ovarian cancer per year will reach 371,000 by 2035; in addition, the number of women diagnosed with this disease will increase by 47% to 434,184 and the number of associated deaths will reach 293,039 by 2040 (1). Studies have also indicated that suicide attempts are more common among women with advanced ovarian cancer when compared to women with other gynecologic cancers (2). Although the incidence of ovarian cancer appears to be lower than that of breast cancer, it is three times more lethal (3), and the majority of women with ovarian cancer (approximately 75%) are diagnosed at a stage when cancer progresses to a more difficult stage to treat. Since cancer prognosis and survival rates differ depending on the stage of the disease when diagnosed, the prognosis and survival rates improve if the disease is diagnosed as early as possible (4). Ovarian cancer is caused by a variety of factors, including lifestyle and environmental and genetic factors. Obesity, physical inactivity (5), infertility, smoking, endometriosis, hormone replacement therapy, family history, and alcohol consumption are among the risk factors for this malignancy. It is noteworthy that many other factors such as pregnancy, breastfeeding, oophorectomy, and taking contraceptive drugs can greatly affect the

severity of this disease (6, 7). The patterns and trends of ovarian cancer differ by region and country; the data indicate that the mortality rate of this cancer, particularly among young women, went through a descending trend from 2002 to 2012 in European countries, Australia, and the US, which could be attributed to the progression of oral contraceptive pills (particularly in European countries and the US) and diagnostic and therapeutic approaches (8). Ovarian cancer is the 17th most common cancer in Iran among both males and females and the 14th leading cause of death from cancer (1). Sharifian *et al.* reported that the prevalence and mortality rate of ovarian cancer had an ascending trend in Iran from 1999 to 2013 (9). Although the prevalence of ovarian cancer is still low in Iran, the rising trend of obesity, physical inactivity, unhealthy diet, older age of menopause, decreasing parity, and lactation are some factors that may increase cancer's prevalence in the future (10). Since there is no comprehensive screening program for ovarian cancer, only one-fifth of cases are diagnosed early in Iran. Contrary to popular belief, there is ample evidence that ovarian cancer has warning signs and symptoms, which are referred to as a "key message". Raising public awareness of ovarian cancer can be helpful in early diagnosis and adequate knowledge of the disease's risk factors can help women recognize symptoms and encourage them to seek and adhere to medical treatments (11). One of the primary reasons for the late diagnosis of cancer is the lack of general knowledge about cancer's early signs and symptoms (12). Most studies on ovarian cancer in Iran have focused on the prevalence and risk factors of this disease, and a few studies have dealt with knowledge about its warning signs and risk factors. This study hence aims to measure the Iranian women's awareness of the warning signs and risk factors for ovarian cancer.

Methods:

This cross-sectional, descriptive study was conducted on women in Kermanshah and Kurdistan provinces, Iran, from September 2020 to June 2021. The participants of this study were selected based on the multi-stage and network sampling methods. First, a list of cities and towns of Kermanshah and Kurdistan provinces was prepared. Then a quota was allocated to each province according to the number of cities, so three cities from Kurdistan Province and four from Kermanshah Province that had a higher population were selected. Finally, Sanandaj, Marivan, and Saqez from Kurdistan Province and Kermanshah, Islamabad Gharb, Sarpol Zahab, and Javanroud from Kermanshah Province were selected for sampling. Midwives working in urban health centers in each city who were willing to participate in this study were briefed on the questionnaire and how it should be completed. After the online multi-stage sampling, the designed questionnaire's link was then provided to midwives online via WhatsApp. The selected midwives then provided the link to the patients who were eligible to participate in the study, after briefing them on the research objectives and procedures. The inclusion criteria were 18–70 years, no history of ovarian cancer, and willingness to participate in the study. The sampling process continued until the intended sample size was completed. Participants were asked to complete the questionnaire after expressing informed consent. The questionnaire was created in Google Forms and the link was sent to participants via WhatsApp. The first section of the online questionnaire thoroughly briefed participants on the objectives and how to complete it. The participants were also assured that their information would be kept confidential. The sample size was calculated using the formula $n = (Z_{1-\alpha/2} + Z_\beta)^2 p (1 - p)/d^2$

assuming a type-1 error of 0.05, power of 80%, and proportion of women with the excellent knowledge of ovarian cancer (p) of 25% (13). The calculated sample size was 918 (d : 0.04); considering that about 30% of questionnaires would be incomplete, the sample size was determined to be 1,150. Cancer Awareness Measure (CAM) is a scale developed in the UK to help measure cancer awareness, identify risk factors related to poor awareness, and develop and evaluate interventions to promote cancer awareness. There are different versions of this valid questionnaire for different cancers that are applicable for face-to-face, online, or telephone interviews and self-administration (11, 14). This questionnaire consisted of 35 items in "warning signs" (10 multiple-choice items and one open-ended item), "delay in seeking medical help" (1 open-ended item), "ovarian cancer age" (one multiple-choice item), "risk factors" (12 multiple-choice items and one open-ended item), "NHS screening programs" (8 items), and "confidence in diagnosing the symptoms of ovarian cancer" (one multiple-choice item). The questionnaire was independently translated from English to Persian (translation forward) by two experts in the first step, after obtaining permission from the developer of the Ovarian Cancer Awareness Measure (OCAM). The research team then combined the two translation versions to create a single copy. Two specialists separately translated the final form into English (translation backward), and the research team merged the two English translations into a single copy (15). The tool was then reviewed by 10 experts (all of whom had a Ph.D. in Reproductive Health and Health Education and were knowledgeable and experienced in the measurement of instruments and ovarian cancer) to provide their corrective feedback on the grammar and vocabulary quality of the text, item arrangement, and scoring system. This version of the questionnaire was tested in a pilot study on ten women qualified for the study, and the final changes were made based on participant feedback. The questionnaire items were reviewed and modified for cultural adaptation in order to eliminate any item that was inappropriate for Iranian culture. Open-ended questions were eliminated from the questionnaire due to the lack of appropriate facilities for face-to-face interviews. To facilitate responses, the open-ended item about health-seeking practices was converted into a multiple-choice item. The answer options included instantly, one week, two weeks, as soon as possible, one month, a few months later, and never. In this study, a modified version of the OCAM was used. The questionnaire included two sections.; the first section consisted of items about demographic information such as language, age, marital status, employment status, educational attainment, place of residence, having a relative, friend, or family member with cancer (considering the cancer type). The second part contained items measuring "warning signs" (10 multiple-choice items), "delay in seeking medical help" (one multiple-choice item), "ovarian cancer age" (one multiple-choice item), "risk factors" (12 multiple-choice items), and "confidence in diagnosing the symptoms of ovarian cancer" (one multiple-choice item) as well as four items concerning national awareness screening programs. Each correct response was assigned a score of 2 to determine the level of awareness about the symptoms, risk factors, common ages of developing ovarian cancer, and national screening programs. A score below 16, between 16 and 36, and over 36 was regarded as low, moderate, and suitable knowledge of ovarian cancer, respectively. Ten experts (reproductive health and health education specialist) were asked to evaluate the validity of the questionnaire's qualitative and quantitative content, and the questionnaire was then modified based on their comments on the grammar, vocabulary, necessity, syntax, collocation, scoring system. For each item, the Likert scale was employed to assess relevance, simplicity, clarity, and necessity, and the content

validity ratio (CVR) was calculated quantitatively. The mean CVR was equal to 0.88, whereas the content validity index (CVI) was greater than 0.79. Internal correlation and test-retest reliability were used to assess the stability of the questionnaire. The most commonly used method for determining internal correlation is Cronbach's alpha, which ranges from 0 to 1. It is appropriate to have an internal correlation greater than 0.7 (16). Cronbach's alpha for the entire questionnaire was 0.88, indicating the appropriate reliability of this tool for the Iranian population. In the retest technique, 20 qualified participants completed the questionnaire twice with a 2-week interval. The intraclass correlation coefficient (ICC) was used to assess the instrument's test-retest reliability, and it was calculated to be 0.86. An ICC of 0.8 or higher indicates excellent stability (17). The quantitative variables in this study were defined by mean, standard deviation, and interquartile range, whereas the qualitative variables were presented by frequency and percentage. The percentage of awareness was shown using bar charts, and ordinal logistic regression was used to determine the predictors of awareness. The data were statistically analyzed in SPSS-19 at the 0.05 level of significance. The rank logistic regression was used in this study to measure the response variable, i.e. knowledge, (good, moderate, and low). Age, educational attainment, family history of cancer, dialect, and marital status were added separately and then concurrently to the model (ordinal logistic regression) to predict the higher chances of knowing.

Findings:

A total of 1,300 women volunteered for this study, but only 1,081 of them completed the questionnaire. Six hundred five samples were from different cities in Kurdistan Province, with Sanandaj having the highest number of participants. Moreover, the highest number of participants in Kermanshah Province were from the city of Kermanshah. The mean age of participants was 32.63 ± 8.13 years. The majority of the participants (n: 772, 71.3%) were Kurdish speakers. 58.3% (n: 631) were married, and most of them (n: 519, 47.9%) had a bachelor's degree. The data showed that most participants (n: 664, 61.3%) had no familial history of cancer (Table 1). The frequency and percentage of ovarian cancer risk factors and warning signs are presented in Table 2. When the self-confidence of participants was tested, the results indicated that 49 participants (4.5%) were utterly sure, 431 (39.8%) were not sure, 363 (33.5%) were not at all sure, and 240 (22.2%) were found to be less confident in identifying ovarian cancer. The results also showed that 470 participants (43.4%) visited medical centers immediately after diagnosis, 96 (8.9%) at the first opportunity, 152 (14%) within one week, 29 (2.7%) within two weeks, 136 (12.6%) within one month, 83 (7.7%) with a delay of several months, and 117 (10.8%) never. The mean and standard deviation of awareness score were 10.57 ± 4.73 , 0.87 ± 0.84 , 16.1 ± 4.25 , and 6.74 ± 1.44 for warning symptoms, age, risk factors, and screening dimensions, respectively. The overall awareness score was obtained 34.29 ± 7.63 (Table 3). In this study, 60.9% and 37.8% of the participants had a moderate and good awareness of ovarian cancer (Fig. 1). The results in Table 4 indicate that women with higher educational attainment and a family history of cancer were more likely to have a higher awareness of ovarian cancer ($p < 0.05$). The multiple-order logistic model demonstrated that educational attainment (a high school diploma: OR = 0.39, P-value < 0.001 and a bachelor's degree: OR = 0.68, P-value = 0.01) and a family history of cancer (OR = 0.62, P-value < 0.001) were other factors affecting participants' awareness.

In this regard, participants with a high school diploma were 0.39 times less likely to be aware of cancer than those with a master's degree or a Ph.D. In addition, participants with a bachelor's degree were 0.68 times less likely to have a high level of cancer awareness than those with a master's or a Ph.D. The results also showed that participants without a family history of cancer were 0.62% less likely to have a high level of cancer awareness than those with a family history of cancer (Table 4).

Table 1
Demographic characteristic of participants (n: 1081)

Variables		Mean	SD
		n	%
age		32.63	8.13
Dialect	Kord	772	71.3
	Fars	278	25.7
	Else	33	3.0
Marital Status	Married	631	58.3
	Single	407	37.6
	Widowed and divorced	45	4.2
Education level	Illiterate and undergraduate	63	5.8
	High school diploma	195	18.0
	Bachelor Degree	519	47.9
	Masters and PhD	306	28.3
Family history of cancer	Negative	664	61.3
	Positive	419	38.7

Table 2
Distribution of Participants Responses to the warning signs and risk factors (*n*:1081).

Domains	Responses on "correct."	n	%
Knowledge of warning signs	persistent abdominal pain	560	51.7
	persistent pelvic pain	518	47.8
	persistent bloating	278	25.7
	increased abdominal size on most days	428	39.5
	feeling full persistently	282	26
	difficulty eating on most days	186	17.2
	passing more urine than usual	315	29.1
	changes in bowel habit	332	30.7
	extreme fatigue	413	38.1
Knowledge of risk factors	back pain	464	42.8
	Having a close relative with ovarian cancer	704	65
	Having a history of breast cancer	561	51.8
	Using HRT (Hormone Replacement Therapy)	681	62.9
	Being overweight (BMI over 25)	592	54.7
	Having endometriosis	556	51.3
	Having ovarian cysts	707	65.3
	Using talcum powder in the genital area	275	25.4
	Being over 50 years old	463	42.8
	Having IVF treatment	231	21.3
	Not having children	345	31.9
	Having gone through the menopause	333	30.7
	Being a smoker	684	63.2

Table 3
mean, SD, IQR, and confidence interval of knowledge on ovarian cancer

Variables	Mean	SD	Confidence interval of the mean		IQR*
			25%	975%	
Warning signs dimension	10.57	4.73	10.29	10.85	6
Ovarian cancer age dimension	0.87	0.84	0.82	0.92	2
Risk factors dimension	16.10	4.25	15.85	16.35	6
national screening programs dimension	6.74	1.44	6.66	6.83	9
Total Score	34.29	7.63	33.83	34.75	9

* Interquartile Range

Table 4
simple and multiple logistic regression of predictors of knowledge on ovarian cancer

Predictors	Simple ordinal logistic regression				Multiple ordinal logistic regression			
	Beta	SE	P-value	OR	Beta	SE	P-value	OR
Age	0.007	0.008	0.39	1.01	.010	.009	0.23	1.01
Dialect	Kord	-0.30	0.36	0.41	0.74	-.255	.366	0.48
Ref = else	Fars	-0.47	0.37	0.21	0.63	-.473	.382	0.22
Marital Status	Married	-0.036	0.32	0.91	0.96	.118	.327	0.72
Ref = Widowed and divorced	Single	0.016	0.32	0.96	1.02	.090	.340	0.79
Education level	Illiterate and High school diploma	-0.37	0.28	0.19	0.69	-.507	.300	0.09
Ref = Masters and PhD	graduate	-0.86	0.19	< 0.001	0.42	-.936	.204	< 0.001
	Bachelor Degree	-0.31	0.14	0.034	0.73	-.387	.151	0.01
Family history of cancer	Negative	-0.45	0.13	< 0.001	0.64	-.465	.129	< 0.001
Ref = Positive								0.62

Discussion:

In this study, 60.9% and 37.8% of participants had moderate and good awareness; meanwhile, participants with higher educational attainment and those with a family history of cancer exhibited higher awareness of cancer. Persistent abdomen pain (51.7%) and persistent pelvic pain (47.8%) were the most recognized symptoms and signs by women among the warnings. On the other hand, the lowest level of awareness was related to “dysphagia (swallowing problems) most days” (17.2%), “persistent bloating” (25.7%), “a sense of abdominal fullness or heaviness” (26%), and “frequent urination” (29.1%). In a study by Low *et al.* in the UK, the lowest level of awareness of warning signs was related to dysphagia (swallowing problems) most days, a persistent sense of fullness, and frequent urination (18). Elshami *et al.* reported that the least recognized signs and symptoms of ovarian cancer among Palestinian women were a persistent sense of fullness and dysphagia (swallowing problems) most days. They hence concluded that Palestinian women had a low level of awareness about ovarian cancer symptoms (19). Within a year of being diagnosed, approximately 25% of ovarian cancer patients experience gastrointestinal problems. Ovarian cancer should be considered in the differential diagnosis of women with goiter symptoms, as it may be effective in the treatment process (20). Goff *et al.* (2004) defined three symptoms (increased abdominal size or bloating, pelvic or abdominal pain, and dysphagia or a sense of quick fullness) for ovarian cancer (21, 22). The study findings demonstrated that the minimum level of awareness was related to the key symptoms of ovarian cancer, and only 51.7% of participants knew that persistent pelvic and abdominal pain is among the symptoms of ovarian cancer, something that can be a serious matter of concern. Some symptoms of ovarian cancer, such as abdominal and pelvic pain, constipation, and increased abdominal size, may be more severe and prevalent among women with ovarian cancer than in the general population (22). Additionally, some symptoms of ovarian cancer may be confused with those of benign and more prevalent diseases, which can prevent timely visits for medical treatments (23). Early visits to medical centers after observing any symptoms of ovarian cancer can be associated with better therapeutic outcomes (24). In this study, 7.7% of participants stated that they will wait several months before visiting a medical center if they suspect the warning signs of ovarian cancer, and 10.8% of them said that they would never seek medical care. The results also showed that 73.3% of participants were not sure about the symptoms of ovarian cancer. The study findings suggested that there is a need for further in-depth investigations into the reasons why women do not visit or visit late medical centers after observing a symptom of ovarian cancer. Such studies are of special importance because the warning signs of ovarian cancer can be confusing for women. Because symptoms such as abdominal pain, anorexia, and a constant sense of fullness have been reported to be associated with the increased mortality risk (24), it is critical to raise women's awareness of the warning signs of ovarian cancer. The lowest level of awareness about risk factors was related to IVF treatment history (21.3%) and the application of talcum powder to the genital area (25.4%). By contrast, the highest level of awareness about risk factors was related to the history of ovarian cysts (65.3%) and a family history of ovarian cancer (65%). It seems the participants were more aware of risk factors than the warning signs of ovarian cancer. Since there is no effective prevention strategy for ovarian cancer, and the prevalence of this disease is influenced by genetic and environmental factors, training can help reduce the prevalence and

mortality rate of ovarian cancer (23), and the raising awareness gained from training can enable women to improve their health control (24). Since the study results demonstrated a link between educational attainment and level of awareness about ovarian cancer, women with higher educational attainment were more aware of ovarian cancer. Educational attainment is one of the most important determinants of cancer awareness (25). Higher educational attainment allows women to become more aware of their environment and health and also increases their chances of accessing health information that will help them follow healthier lifestyles (26). Some studies conducted in low-income countries showed a significant relationship between the educational attainment of women and their awareness of ovarian cancer, as women with higher educational attainment were more aware of ovarian cancer. This is consistent with the findings of this study (27, 28). Women with a family history of cancer were more aware of ovarian cancer in this study. The emotional experience of cancer among one's relatives can significantly affect one's level of anxiety and sensitivity to the warning signs and risk factors for cancer (29). Individuals who understand the risk of cancers are more likely to decide to seek screening programs, behavioral changes, or medical treatment (30). A family history of ovarian cancer or other cancers is one of the most common reasons why some people understand a higher risk of cancers. The main strength of this study is that it was one of the first studies to deal with women's awareness of the risk factors and warning signs of ovarian cancer, as well as their knowledge of screening methods. However, this study had some limitations in terms of design and procedure. For example, the data were collected via an online questionnaire due to the COVID-19 pandemic. Although online data collection tools bring advantages such as lower cost (31), higher quality of gathered data (32), and shorter data entry (33), one of the limitations of such tools is the possible limited internet access for some community members. Since only 52% of people are internet users with moderate skills in the studied regions, Kurdistan and Kermanshah provinces of Iran (34), it was not possible to measure the awareness of women who had no internet access or knowledge. Moreover, because only 258 members of the study population (23.8%) had a high school diploma or a higher degree, future studies are recommended to evaluate the level of awareness about ovarian cancer among women with lower educational attainment.

Conclusion:

The study findings suggested that Iranian women have moderate awareness of ovarian cancer and low knowledge of its warning signs. The results showed that the lowest knowledge of warning signs was related to dysphagia (swallowing problems) most days, persistent bloating, constant sense of abdominal fullness and heaviness, and frequent urination. Furthermore, the lowest knowledge of risk factors was related to the application of talcum powder to the genital area (25.4%) and history of IVF treatment (21.3%). Given that the awareness of warning signs, risk factors, and age of cancer incidence can facilitate the early diagnosis of ovarian cancer, it is necessary to train women in these issues to raise awareness. Considering the status quo in this regard, the study results can also be effective in evaluating and designing prevention programs for ovarian cancer.

List Of Abbreviations:

Ovarian Cancer Awareness Measure (OCAM)

Cancer Awareness Measure (CAM)

Declarations:

Ethics approval and consent to participate:

This study was extracted from a research project (Code of Ethics: IR.SBMU.PHARMACY.REC.1400.238) approved by Vice-Chancellor's Office of Research at Shahid Beheshti University of Medical Sciences. Written informed consent was obtained from each participant. All methods were performed in accordance with the relevant guidelines and regulations.

Consent for publication:

Not applicable

Competing interests:

The authors declare that they have no competing interests.

Funding:

Nil

Authors' contributions:

All authors contributed to data analysis, drafting or revising the article, gave final approval of the version to be published, and agree to be accountable for all aspects of the work.

Acknowledgements:

Not applicable

Availability of data and materials:

The datasets generated and/or analysed during the current study are not publicly available due they contain information that could compromise research participant privacy but are available from the corresponding author on reasonable request.

References:

1. Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin. 2018;68(6):394-424.

2. Chen Y, Yu K, Zhu Q, Tang W, Chen D, Xue L, et al. Suicide and Accidental Death Among Women with Primary Ovarian Cancer: A population-based study 2021.
3. Yoneda A, Lendorf ME, Couchman JR, Multhaupt HA. Breast and ovarian cancers: a survey and possible roles for the cell surface heparan sulfate proteoglycans. *J Histochem Cytochem*. 2012;60(1):9-21.
4. Ott JJ, Ullrich A, Miller AB. The importance of early symptom recognition in the context of early detection and cancer survival. *Eur J Cancer*. 2009;45(16):2743-8.
5. Biller VS, Leitzmann MF, Sedlmeier AM, Berger FF, Ortmann O, Jochem C. Sedentary behavior in relation to ovarian cancer risk: a systematic review and meta-analysis. *Eur J Epidemiol*. 2021;36(8):769-80.
6. Reid BM, Permuth JB, Sellers TA. Epidemiology of ovarian cancer: a review. *Cancer Biol Med*. 2017;14(1):9-32.
7. Momenimovahed Z, Tiznobaik A, Taheri S, Salehiniya H. Ovarian cancer in the world: epidemiology and risk factors. *Int J Women's Health*. 2019;11:287-99.
8. Malvezzi M, Carioli G, Rodriguez T, Negri E, La Vecchia C. Global trends and predictions in ovarian cancer mortality. *Ann Oncol*. 2016;27(11):2017-25.
9. Sharifian A, Pourhoseingholi MA, Norouzinia M, Vahedi M. Ovarian Cancer in Iranian Women, a Trend Analysis of Mortality and Incidence. *Asian Pacific journal of cancer prevention: APJCP*. 2014;15:10787-90.
10. Arab M, Noghabaei G. Ovarian Cancer Incidence in Iran and the World. *Rep Radiother Oncol*. 2013;1(2):e2391.
11. Simon AE, Wardle J, Grimmett C, Power E, Corker E, Menon U, et al. Ovarian and cervical cancer awareness: development of two validated measurement tools. *J Fam Plann Reprod Health Care*. 2012;38(3):167-74.
12. Macleod U, Mitchell ED, Burgess C, Macdonald S, Ramirez AJ. Risk factors for delayed presentation and referral of symptomatic cancer: evidence for common cancers. *Br J Cancer*. 2009;101 Suppl 2(Suppl 2): S92-S101.
13. Okunowo AA, Adaramoye VO. Women's Knowledge on Ovarian Cancer Symptoms and Risk Factors in Nigeria: An Institutional-based Study. *Journal of epidemiology and global health*. 2018;8(1-2):34-41.
14. Stublings S, Robb K, Waller J, Ramirez A, Austoker J, Macleod U, et al. Development of a measurement tool to assess public awareness of cancer. *Br J Cancer*. 2009;101 Suppl 2(Suppl 2): S13-S7.
15. Process of translation and adaptation of instruments [internet]. 2009. Available from: https://www.who.int/substance_abuse/research_tools/translation/en/.
16. Cronbach LJ. Coefficient alpha and the internal structure of tests. *Psychometrika*. 1951;16(3):297-334.

17. PESUDOVS K, BURR JM, HARLEY C, ELLIOTT DB. The Development, Assessment, and Selection of Questionnaires. *Optometry and Vision Science*. 2007;84(8):663-74.
18. Low EL, Waller J, Menon U, Jones A, Reid F, Simon AE. Ovarian cancer symptom awareness and anticipated time to help-seeking for symptoms among UK women. *Journal of Family Planning and Reproductive Health Care*. 2013;39(3):163-71.
19. Elshami M, Yaseen A, Alser M, Al-Slaibi I, Jabr H, Ubaiat S, et al. knowledge of ovarian cancer symptoms among women in Palestine: a national cross-sectional study. *BMC Public Health*. 2021;21(1):1992.
20. Chase DM, Neighbors J, Perhanidis J, Monk BJ. Gastrointestinal symptoms and diagnosis preceding ovarian cancer diagnosis: Effects on treatment allocation and potential diagnostic delay. *Gynecol Oncol*. 2021;161(3):832-7.
21. Goff BA, Mandel LS, Drescher CW, Urban N, Gough S, Schurman KM, et al. Development of an ovarian cancer symptom index: possibilities for earlier detection. *Cancer*. 2007;109(2):221-7.
22. Goff BA, Mandel LS, Melancon CH, Muntz HG. Frequency of symptoms of ovarian cancer in women presenting to primary care clinics. *Jama*. 2004;291(22):2705-12.
23. Morris M, Friedemann Smith C, Boxell E, Wardle J, Simon A, Waller J. Quantitative evaluation of an information leaflet to increase prompt help-seeking for gynecological cancer symptoms. *BMC Public Health*. 2016;16:374-.
24. Dilley J, Burnell M, Gentry-Maharaj A, Ryan A, Neophytou C, Apostolidou S, et al. Ovarian cancer symptoms, routes to diagnosis and survival - Population cohort study in the 'no screen' arm of the UK Collaborative Trial of Ovarian Cancer Screening (UKCTOCS). *Gynecol Oncol*. 2020;158(2):316-22.
25. Feizi A, Kazemnejad A, Babaee G, Parsayekta Z, Monjamed Z. Public awareness of risk factors for cancer and its determinants in an Iranian population. *Asia Pac J Public Health*. 2010;22(1):76-88.
26. Sani AM, Naab F, Aziato L. Influence of educational level on knowledge and practice of breast self-examination among women in Sokoto, Nigeria. *Journal of Basic and Clinical Reproductive Sciences*. 2016;5:100 - 6.
27. Freij M, Al Qadir M, Khadra M, M AL, Tuqan W, Al-Faqih M, et al. Awareness and Knowledge of Ovarian Cancer Symptoms and Risk Factors: A Survey of Jordanian Women. *Clin Nurs Res*. 2018;27(7):826-40.
28. Elmahdi N, Latiff L, Mehrnoosh A-Z, Ismail M, Manaf R, Shah A, et al. A Cross-sectional Study of Ovarian Cancer Knowledge and Its Determinants among Female Employees in a. *Malaysian Journal of Medicine and Health Sciences*. 2017;13:71-9.
29. Peipins LA, McCarty F, Hawkins NA, Rodriguez JL, Scholl LE, Leadbetter S. Cognitive and affective influences on perceived risk of ovarian cancer. *Psychooncology*. 2015;24(3):279-86.
30. Sivell S, Elwyn G, Gaff CL, Clarke AJ, Iredale R, Shaw C, et al. How risk is perceived, constructed, and interpreted by clients in clinical genetics, and the effects on decision making: a systematic review. *J Genet Couns*. 2008;17(1):30-63.

31. Brunswick N, Wardle J, Jarvis MJ. Public awareness of warning signs for cancer in Britain. *Cancer Causes Control*. 2001;12(1):33-7.
32. Kongsved SM, Basnov M, Holm-Christensen K, Hjollund NH. Response rate and completeness of questionnaires: a randomized study of internet versus paper-and-pencil versions. *J Med Internet Res*. 2007;9(3):e25.
33. Wright KB. Researching Internet-Based Populations: Advantages and Disadvantages of Online Survey Research, Online Questionnaire Authoring Software Packages, and Web Survey Services. *Journal of Computer-Mediated Communication*. 2017;10(3).
34. Report on the development of information and communication technology index in the provinces of the country 2021 [Available from: <https://ito.gov.ir/fa/news/106215/>.

Figures

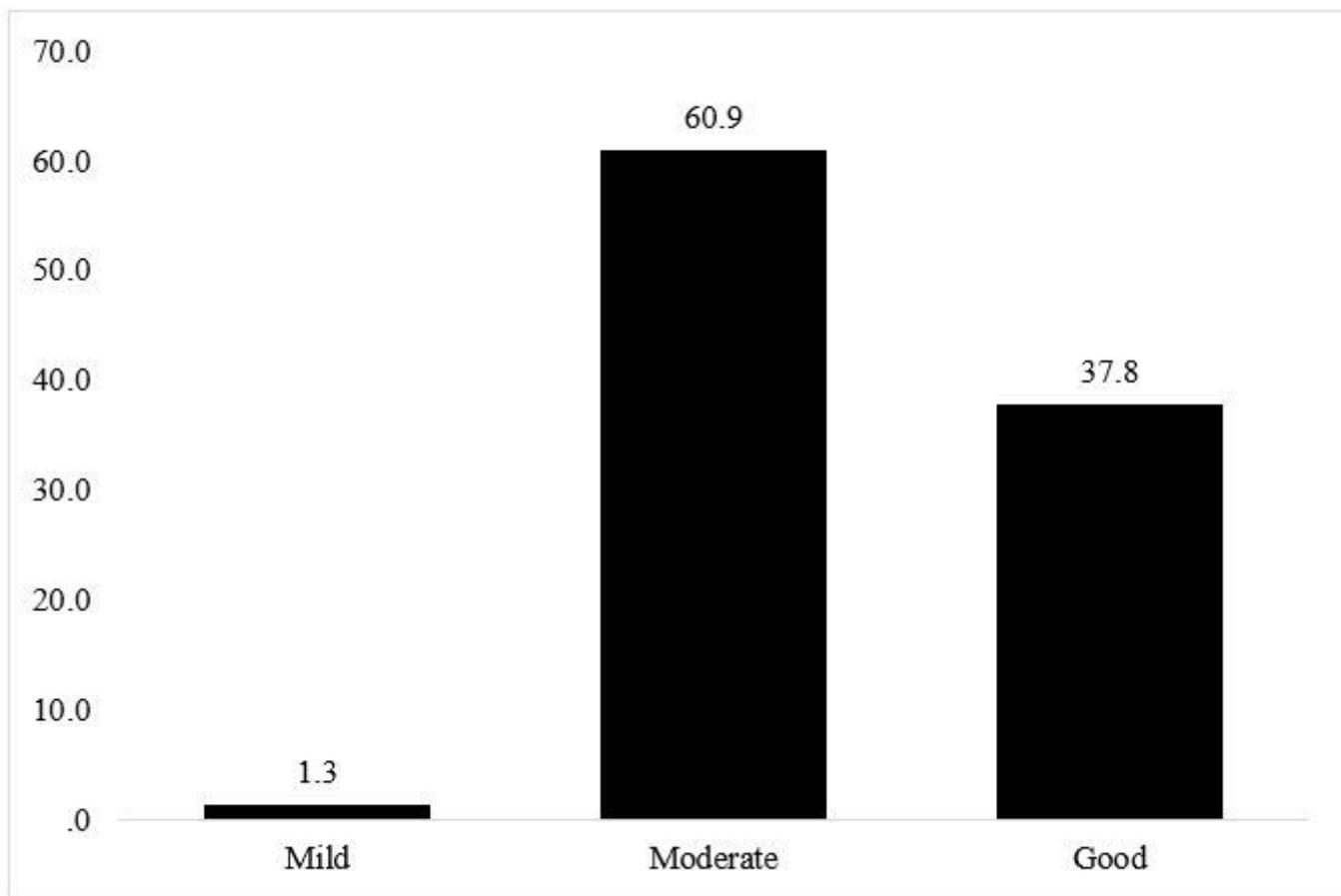


Figure 1

Percent of the level of knowledge on ovarian cancer