Original Research

Prevalence of being 'at risk' of endometrial carcinoma among postmenopausal women in Sri Lanka

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Abstract

Introduction: Identifying women who are at risk of developing endometrial carcinoma helps to personalize the management strategies by increasing the survival of high-risk women.

Objectives: To estimate the 'at risk' prevalence and prevalence of selected risk factors for endometrial carcinoma among postmenopausal women in the district of Colombo

Methods: A community-based descriptive cross-sectional study was conducted among 1168 postmenopausal women selected using multistage cluster sampling technique. Women who are 'at risk' for developing endometrial carcinoma was decided based on a cut-off value developed for the set of predictors related to the risk of developing endometrial carcinoma among postmenopausal women.

Results: The prevalence of at risk of endometrial carcinoma was 19.2% (95% CI=17.0-21.6). The prevalence of selected risk factors: physical inactivity 86.2% (95% CI=84.1-88.1), hypertension 37.8% (95% CI=35.1-40.7), diabetes mellitus 39.9% (95% CI=37.1-42.8), early menarche 12.1% (95% CI=10.3-14.1), late menopause 5.7% (95% CI=4.5-7.2), never conceived 7.8% (95% CI=6.3-9.5), generalized obesity 48% (95% CI=45.1-50.9), central obesity 58.6% (95% CI=55.8-61.5), and inadequate servings of vegetables and fruits 69.4% (95% CI=66.8-72.0).

Conclusions & Recommendations: The identification of 'at risk' women who need to be investigated or followed up closely for endometrial carcinoma and the observed high prevalence of selected modifiable risk factors among postmenopausal women warrant population level interventions to curb unhealthy lifestyle practices and advocate relevant stakeholders for prompt action since childhood as a primary prevention measure.

Key words: *endometrial carcinoma, women at risk, increased risk, risk factor prevalence*

Introduction

Endometrial carcinoma (EC) is the fourth commonest cancer among women (1), as well as the commonest gynaecological cancer in the developed world (2). Population aging and rise in obesity both have joint impacts on the rising incidence of endometrial carcinoma in developing countries as well.

According to the latest statistics available for Sri Lanka, 4% of all reported incident cancer cases among women in 2010 were due to endometrial carcinoma. It was the eighth commonest cancer among women in Sri Lanka (3). When the age group cancer distribution was compared, endometrial carcinoma was responsible for 6.4% of all the cancers seen among women of 50-64 years and was the fourth commonest cancer among women.

Early-stage endometrial carcinoma shows a good prognosis; therefore, the importance of early detection of the disease is felt vital. The five-year survival of stage I, II, III and IV of the disease are nearly 85%, 70-75%, 45% and <30%, respectively (4). This indicates that endometrial carcinoma has a better survival if detected at an early stage. Transvaginal ultrasound scanning (TVS) provides the best screening test for early detection of EC in the developed countries (5). Factors such as financial, human resource and infrastructure shortages of performing invasive procedure are vital factors that have precluded the developing countries to consider such a method in a population-level routine screening programme. Hence, screening of only high-risk women may be an alternative for resource limited countries like Sri Lanka. The well women clinic setting and healthy lifestyle centres in our public health system are ideal platforms which have been implemented for our women to receive health care services in the community. Therefore, we can use the already established stable settings for our public health staff to identify most at-risk women for EC using low-cost screening tool at community level.

Few countries have developed tools to predict the risk of a woman developing endometrial carcinoma, such as RAAMP model, Norwich DEFAB model, RHEA model and Opolskiene model (6-9). The risk predictors included in the RAAMP model are recurrent vaginal bleeding, age at presentation, age at menopause, body mass index (BMI) and parity. Norwich DEFAB is another comprehensive model developed in the United Kingdom and the included clinical predictors are diabetes mellitus, endometrial thickness, frequency of bleeding, age and BMI. However, the fact that these models are specific for a population and setting which they were developed for, recommends the need for a country-specific risk prediction model developed and validated based on country-specific risk factors to identify high risk women for developing endometrial carcinoma.

Estimation of 'at risk' prevalence provides valuable epidemiological data which helps the health care managers to take decisions on preventive and management strategies. It further guides to formulate effective policies for controlling the disease and to minimize the effects of the risk factors by planning cost effective control programmes targeting endometrial carcinoma (10).

Literature shows that generalized obesity, central obesity, physical inactivity, diabetes, hypertension, early menarche, late menopause, hormone therapy, never conceived and failure to take recommended vegetables and fruits servings are the most common risk factors associated with the development of endometrial carcinoma globally (11-15). Further, the prevalence of modifiable risk factors of endometrial carcinoma is increasing in Sri Lanka due to the economic transition, increased urbanization and lifestyle changes taking place (16). According to Asian cut-offs, the age-specific prevalence of overweight, obesity and central obesity among women aged 50-59 were 33.0%, 12.8% and 41.1%, respectively (17). The prevalence of diabetes mellitus in Western Province was 18.6% (18). Therefore, assessing the burden of 'at risk' women for endometrial carcinoma the prevalence of selected risk factors among the postmenopausal women and are necessary in assisting the health care providers for strengthening the infrastructure as well as planning and implementing an effective screening programme.

Methods

A community-based descriptive cross-sectional study was carried out in the district of Colombo in Western Province, Sri Lanka. Data collection was carried out from November 2017 to February 2018. Postmenopausal women currently residing in the district for at least 6 months were taken as the study population. Women who are already diagnosed with any type of cancer and those not able to give rational information due to any reason such as mental retardation were excluded.

Sample size was determined based on the minimum sample required to detect the expected prevalence of increased risk for developing endometrial carcinoma among postmenopausal women, with a pre-determined level of precision of 0.05, 95% confidence interval (CI) and expected proportion of individuals at risk of developing endometrial carcinoma among postmenopausal women of 50% in the absence of previous research data. Since cluster sampling method was used in selecting study units, the effect of clustering was overcome by making a correction for design effect, which increased the precision (19). Thus, the calculated minimum sample size was 1114. A further adjustment for the sample size was done by adding 5% to account the non-response for participation. Finally, the total sample size was taken as 1200 by rounding up to divide clusters easily.

Multi-stage, cluster sampling technique was used to select a total sample of 1200 study units in the district of Colombo. This district comprises 13 divisional secretariat (DS) divisions and study units were selected from all 13 DS divisions. The sample was selected to be probability proportional to size (PPS) of the population living in different GN divisions of 13 DS divisions in the district. A cluster in this study was defined as a group of postmenopausal women in a GN division and the number of study units in a cluster was taken as 20. There were 60 GN divisions from which a total of 557 GN divisions in Colombo district were selected. The secondary sampling unit was a household. The second stage of sampling was to select 20 households using systematic sampling method from each of these selected GN divisions. In the final stage, only one eligible woman was selected from one household using simple random method. This process was repeated until the 20 study units were selected in one cluster.

An interviewer-administered-questionnaire including variables in a country-specific risk prediction model and selected risk factors was used to collect data from the study participants. The country-specific risk prediction model used had been developed and validated by the authors, based on the risk factors of an unmatched case-control study conducted in the Western Province with the participation of 83 histologically confirmed incident endometrial carcinoma cases and 332 histologically excluded controls (20). The developed risk prediction model is valid to identify high risk women of developing endometrial carcinoma at the cut-off of 3.5 (range of score: 0-9); sensitivity 65.7% (95% CI=47.7-80.3); specificity 76.0% (95% CI=61.5-86.5) and area under the curve 0.778 (95% CI=0.679-0.877; $p<0.001$) (21). Table 1 shows the developed risk prediction model comprising six risk predictors and individual score to each predictor. Five pre-intern medical officers were recruited as research assistants, and they were trained for the data collection at the community setting. Written consent was obtained before administering the questionnaire.

Common risk factors of endometrial carcinoma such as generalized obesity, central obesity, physical inactivity, diabetes, hypertension, early menarche, late menopause, never conception and failure to take recommended vegetables and fruits servings were inquired in an interviewer- administered-questionnaire under selected risk factors considering the feasibility of data collection in the community. Consumption of at least five servings of vegetables and fruits per day was considered as adequate. Women who were involved in physical activity for minimum of 30 minutes per day for at least five days in a week were defined as physically active and women who are not categorized as physically inactive. Generalized obesity was categorized based on BMI according to the WHO definitions for adult Asians, BMI ≥ 25 kg/m^2 was categorized as obese. Central obese was defined as waist circumference of 80cm or more based on American Diabetes Association Criteria.

Data analysis was done using Statistical Package for Social Sciences (SPSS) version 21 software. The socio-demographic characteristics of the study units were described by frequency distribution. The 'at risk' prevalence for developing endometrial carcinoma among postmenopausal women and the prevalence of each risk factor were given with 95% CI.

Results

Of the invited 1200 eligible postmenopausal women, 32 did not participate in the study (response rate=97.3%). Reason for non-participation was unavailability to gather data even after repeated visits (n=23) and refusal (n=9). The women among respondent and non-respondent groups were similar in respect of selected socio demographic characteristics.

Socio-demographic characteristics of the study population are given in Table 2. Majority of the postmenopausal women (n=915; 78.3%) were aged more than 55 years. Most of the participants were Sinhalese (n=785; 67.2%). A majority were Buddhist (n=591; 50.6%) followed by Catholics/Christians (n=289; 24.7%). Majority of the study participants have completed G.C.E. A/Level (n=313; 26.8%) and had never been employed (n=583; 49.9%). A higher proportion of postmenopausal women in the study population had a monthly family income more than Rs. 30,000.

Table 3 shows the distribution of predictor variables in the risk prediction model among the study population. Most of the women had never conceived during their lifetime (n=1077; 92.2%). Majority had attained menarche after the age of 11 years (n=1027; 87.9%). Majority of the postmenopausal women had never experienced postmenopausal bleeding (n=1097; 93.9%). Only 15.9% of the women had a family history of any type of cancer among first degree relatives. Almost half of the study population were generally obese with BMI ≥25 kg/m^2 (n=561; 48.0%).

Postmenopausal women who obtained a total risk score of 3.5 or more were considered as 'at risk' for developing endometrial carcinoma, while those with a total risk score of less than 3.5 were categorized as 'not at risk'. Table 4 shows the prevalence of women 'at risk' of developing endometrial carcinoma among the study participants. By using developed risk prediction model, 224 postmenopausal women had scored more than 3.5 comprising 19.2% of total study population.

Table 5 shows the prevalence of women 'at risk' of developing endometrial carcinoma among the study population for selected socio-demographic characteristics. Prevalence of being 'at risk' of developing endometrial carcinoma among women who are more than 55 years (17.1%; 95% CI=15.01-19.41) was significantly higher than that among women who are 55 years or less (2.0%; 95% CI=1.32-3.04). Similarly, the prevalence of being 'at risk' of developing endometrial carcinoma among Sinhalese (12.3%; 95% CI=10.5-14.35) was significantly higher than that among the non-Sinhalese (6.8%; 95% CI=5.47-8.45). Further, there is no significantly difference observed in prevalence of being 'at risk' of developing endometrial carcinoma in education level, being currently employed or not and income level.

Table 6 shows the prevalence of selected risk factors for endometrial carcinoma among postmenopausal women in district of Colombo. Prevalence of physical inactivity was 86.2% (95% CI=84.1-88.1). The prevalence of chronic diseases such as diabetes mellitus and hypertension among the study population were 39.9% (95% CI=37.1-42.8) and 37.8% (35.1-40.7), respectively. Prevalence of early menarche (≤11 years) among the postmenopausal women was 12.1% (95% CI=10.3-14.1) and prevalence of late menopause (≥55 years) was 5.7% (95% CI=4.5-7.2). Prevalence of never conceived among postmenopausal women in Colombo District was 7.8% (95% CI=6.3-9.5). The prevalence of generalized obesity, BMI ≥25 kg/m^2 among the postmenopausal women was 48.0% (95% CI=45.1-50.9). The prevalence of central obesity, waist circumference ≥80 cm among them was 58.6% (95% CI=55.8-61.5). Prevalence of not taking recommended vegetable and fruit servings per day was 69.4% (95% CI=66.8-72.0).

Table 1: Predictor variables in the final risk prediction model

Predictor variable	Categories	Weighted score
Age of the postmenopausal woman	> 55 years	1
	≤ 55 years	0
History of conception	Never conceived	1
	Ever conceived	0
Age at menarche	≤ 11 years	1
	>11 years	0
Experience of post-menopausal bleeding	Ever experienced	2
	Never experienced	0
Family history of any type of cancer	Yes	2
	No	0
Generalized obesity (BMI)	≥ 25	2
	< 25	0
Total score		**9**

Table 2: Socio-demographic characteristics of the study population (N=1168)

Characteristics		Postmenopausal women	
		No.	%
Age	55 years or less	253	21.7
	More than 55 years	915	78.3
Ethnicity	Sinhala	785	67.2
	Tamil	196	16.7
	Muslim	184	15.8
	Burgher	4	0.3
Religion	Buddhist	591	50.6
	Catholic/Christian	289	24.7
	Hindu	184	15.8
	Islam	104	8.9
Level of education	No formal education	17	1.5
	Grade 1-5	161	13.8
	Grade 6-10	179	15.3
	Completed G.C.E O/Level[1]	306	26.2
	Grade 11-13	43	3.7
	Completed G.C.E A/Level[2]	313	26.8
	Technical/Vocational/Diploma	94	8.0
	University/post graduate	55	4.7
Employment Status	NCurrently employed	230	19.7
	Previously employed	355	30.4
	Never employed	583	49.9
Monthly family income (Rs.)	≤ 10,000	121	10.4
	10,001-20,000	260	22.3
	20,001-30,000	272	23.3
	>30,000	515	44.1
Total		**1168**	**100.0**

[1] General Certificate Exam Ordinary Level [2] General Certificate Exam Advance Level

Table 3: Distribution of predictor variables in the risk prediction model among the study population

Predictor variable	Categories	No.	%
Conception	Never conceived	91	7.8
	Ever conceived	1077	92.2
Age at menarche	≤ 11 years	141	12.1
	>11years	1027	87.9
Experience of post-menopausal bleeding	Ever experienced	71	6.1
	Never experienced	1097	93.9
Family history of any type of cancer	Yes	186	15.9
	No	982	84.1
BMI (kg/m^2)	≥ 25	561	48.0
	< 25	607	52.0
Total score		**1168**	**100.0**

Table 4: Prevalence of women 'at risk' for developing endometrial carcinoma among the study population for selected socio-demographic characteristics

Characteristic		No. 'at risk' (N=224) [x]	% (x/1168)	95% CI
Age	55 years or less	24	2.0	1.32-3.04
	More than 55 years	200	17.1	15.01-19.41
Ethnicity	Sinhalese	144	12.3	10.50-14.35
	Non-Sinhalese	80	6.8	5.47-8.45
Level of education	≤ G.C.E. A/Level[1]	139	11.9	10.10-13.9
	> G.C.E.A/Level[2]	85	7.3	5.85-8.92
Employment status	Never employed	114	9.8	8.12-11.61
	Ever employed	110	9.4	7.80-11.24
Monthly family income (Rs.)	≤ 20,000.00	63	5.4	4.17-6.86
	> 20,000.00	161	13.8	11.86-15.9

[1] General Certificate Exam Ordinary Level [2] General Certificate Exam Advance Level

Table 5: Prevalence of selected risk factors for endometrial carcinoma

Risk factors for endometrial carcinoma	Prevalence (%)	95% CI
Generalized obesity (BMI ≥25 kg/m^2)	48.0	45.1-50.9
Physical inactivity	86.2	84.1-88.1
Diabetes mellitus	39.9	37.1-42.8
Hypertension	37.8	35.1-40.7
Early menarche (≤ 11 years)	12.1	10.3-14.1
Late menopause (≥55 years)	5.7	4.5-7.2
Never conceived	7.8	6.3-9.5
Central obesity (Waist circumference ≥ 80 cm)	58.6	55.8-61.5
Not taking recommended vegetables and fruits servings per day	69.4	66.8-72.0

Discussion

A descriptive cross-sectional study was conducted to estimate the prevalence of 'at risk' women for developing endometrial carcinoma using a country-specific risk prediction model and to estimate the prevalence of selected risk factors for endometrial carcinoma among postmenopausal women. A multi-stage cluster sampling technique with probability proportional to size was used in the study to obtain the sample as the most feasible sampling technique in community settings. Cluster sampling was used to obtain a sample probability proportional to the size of the population living in different GN divisions in DS divisions of Colombo District. Bennett & Colleagues (19) explained possible ways to overcome the effect of clustering. There was minimal loss of precision due to clustering in this study, as clusters were made more heterogeneous within themselves, by including more clusters with many levels (22). Clustering effect was further reduced in this study by allocating only 20 study units in to one cluster and selecting only one eligible study unit from one household. Hence, the selection of the sample was done with measures eliminating selection bias and minimizing the role of chance, enabling the results to be generalized among postmenopausal women in the district of Colombo improving external validity of the findings in the study.

This study was carried out as a community-based household survey, where all the eligible women including women at work were also recruited into the study. Two consecutive visits were made, if the eligible study unit was not available at the time of the first visit. Selection procedure was supervised frequently by the principal investigator to further minimize the selection bias. Use of an interviewer-administered-questionnaire to collect data allowed to carry out uniform data collection from the study units with any educational background. Simple close-ended questions were included in the questionnaire and it made easy to recall past items and addressed the issue of recall bias.

The prevalence of 'at risk' women for developing endometrial carcinoma was 19.2% (95% CI=17.0-21.6%). Since the current study used a validated risk prediction model and assessed the prevalence based on a validated cut-off determined through validation with a gold standard (histological assessment) (21), this prevalence value is considered to reflect the true prevalence of 'at risk' postmenopausal women for endometrial carcinoma among the study population. The prevalence of 'at risk' for endometrial carcinoma detected in the current study cannot be compared with the other studies as the risk predictors used in risk prediction models vary from one model to the other. However, the absence of estimated prevalence of 'at risk' women for endometrial carcinoma using a risk prediction model in literature, precludes the possibility of comparing the magnitude of prevalence in any location at any given time.

The postmenopausal women who were categorized as 'at risk' from the risk prediction model can be guided to further investigations or to emphasize on frequent follow ups. The lifestyle factors which were used in risk prediction model may be in particular use in planning and implementing health promotion activities targeting individual level (23).

In the present study, 48% of postmenopausal women in the study sample were with generalized obesity and 58.6% of them were centrally obese. It was shown in a national study conducted by Katulanda et al. (17), the obesity prevalence among women was 11.3% and prevalence of central obesity among women was 36.3%. These measures were with geographical variations; it was more prevalent among urban population compared to rural residence showing 20.7% of women were obese and 53.2% of women were centrally obese. Due to the recent nutrition transition, the pattern of diet and physical activity had been shifted from healthy to unhealthy resulting in epidemics of certain outcomes especially in lower- and middle-income countries (24).

A majority of postmenopausal women were physically inactive, resulting in 86.2% of high prevalence of physical inactivity in the population of the present study. Consistent high value of physical inactivity was revealed in recent STEP Survey findings, 96.3% of women aged 45-59 and 97.2% of women aged 60-69 were physically inactive for recreation related physical activities. These

differences in reported prevalence could be due to the variations in the tools to measure physical activity, the age groups considered and the definition of physical inactivity by different researchers (25).

In the present study, prevalence of diabetes and hypertension among postmenopausal women in the district of Colombo was 39.9% and 37.8%, respectively. In a national study conducted among adults over 18 years of age showed the prevalence of diabetes mellitus to be 22.1% in Western Province (18). The recent STEP Survey revealed the prevalence of diabetes mellitus among women aged 45-59 years to be 60.4% and 79.2% among women aged 60-69 years (25). In STEP Survey, prevalence of diabetes and hypertension was measured based on self-reported information on the disease. In this study, presence of diabetes mellitus and hypertension was assessed based on the clinical records and reports. Women who were already diagnosed of those two diseases were included in the prevalence estimates. Women who were not diagnosed but having the disease were not included. It was a limitation of the current study. The observed differences of the prevalence values in the two studies could be resulted in by the differences in assessing the disease conditions in each study.

Further, the prevalence of inadequate intake of vegetable and fruit servings per day was 69.4% in the current study. Consistent results were shown in the STEP Survey, 74.3% of women aged 45-59 years were not taking adequate servings of vegetables and fruits per day (25).

The observed high prevalence of selected modifiable risk factors for endometrial carcinoma among postmenopausal women warrants population level interventions to curb unhealthy lifestyle practices and advocate relevant stakeholders for prompt action since childhood as a primary prevention measure. Further, this brings into light the importance of empowering women on enhancing family nutrition and to address the need of consuming recommended vegetable and fruit servings in the health promotion activities in the country.

Conclusions & Recommendations

The prevalence of women 'at risk' of developing endometrial carcinoma in the district of Colombo was relatively high, with 19.2% identified as being at risk. Moreover, a high prevalence of selected modifiable risk factors for endometrial carcinoma was observed among postmenopausal women in the district of Colombo. It warrants population level interventions to curb unhealthy lifestyle practices and advocate relevant stakeholders for prompt action since childhood as a primary prevention measure. Further, the postmenopausal women who were identified as 'at risk' can be followed up with further investigations, thus the study recommends the risk prediction model to be incorporated into the existing health system at the curative and preventive sectors in Sri Lanka.

Public Health Implications

High prevalence of 'at risk' women and selected risk factors for developing endometrial carcinoma emphasize the threats and challenges to the Sri Lankan health care system in the future. Therefore, it is high time to advocate on population level healthy lifestyle behaviours in order to reduce the burden of endometrial carcinoma and improve quality of life. With the incorporation of the developed risk prediction model into the existing healthcare system at the community setting as well as at the curative setting can be useful for early detection of endometrial carcinoma.

Author Declarations

Competing interests: No conflict of interests

Ethics approval and consent to participate: Ethical clearance to carry out the study was obtained from the Ethics Review Committee, Faculty of Medicine, University of Kelaniya, Sri Lanka (Ref: P/83/07/2016). Written consent was taken from the participants prior to the administration of the questionnaire. This study was conducted in accordance with the Declaration of Helsinki.

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Author contributions: WIUJ was involved in the conceptualization of the research, literature search, data extraction, data analysis and drafting of the initial manuscript. CA was involved in conceptualization of the research, literature search, data analysis and editing the manuscript. All authors read the final manuscript.

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