Association of Employment, Working Hours per Week and Nightshifts with the
Risk to Breast Cancer in Sudanese Women

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Key wards: breast cancer, nightshift, working hours per week, Sudan.
المقدمة: سرطان الثدي يعتبر من أكثر السرطانات شيوعاً في السودان. دراسة علاقة العمل والساعات التي تضمنها المرأة في العمل خلال الأسبوع وورديات الليل تعتبر من الدراسات ذات النتائج المضرارية. رغم أن الوكالة العالمية لإبحاث السرطانات صنفت العمل ذوي طابع الورديات الليلية من مسببات السرطان.

الوسائل: تتضمن هذه الدراسة 100 امرأة مصابة بسرطان الثدي و 50 امرأة غير مصابة بسرطان الثدي. وقد قمنا بطرح اسالة من خلال استبيان للمجموعتين عن العمل وعدد ساعاته خلال الأسبوع وورديات الليلية.

النتائج: بعد مقارنة المجموعتين وجدنا صلة بين العمل، وزيادة ساعات العمل بسرطان الثدي عند النساء، ولكن لم نجد صلة لسرطان الثدي والعمل الذي يتطلب ورديات ليلية.

المناقشة: و على أن العمل وعدد الساعات لهم صلة بسرطان الثدي وذلك ربما لنوع العمل وعدد اتباع نظام حياة صحي. أما العمل بورديات ليلية الذي لم تثبت صلته بسرطان الثدي في هذه الدراسة يرجح أن عدد العينات كان قليلاً ولايكفي لإظهار الصلة. نخصص للان نوع العمل وعدد ساعات العمل قد يسبب سرطان الثدي و ذلك ربما لعدم توفر البيئة الصحية اللازمة. ولذلك يجب القيام بدراسة ذات عينات أكبر لمعرفة صلة سرطان الثدي بالعمل ونوعة وعدد الساعات وورديات الليلية.
Abstract:
Breast cancer (BC) is by far the most commonly diagnosed cancer in Sudanese women. The relationship between employment, working hours per week and nightshifts as risk factors to BC risk has been a subject of controversial epidemiological findings. In this case-control study of 100 of BC patients and 50 controls, we assessed the association of BC with employment, working hours per week and nightshifts. There was an elevated correlation between employment (P.Value = 0.03), working hours per week (P.Value = 0.02) and BC risk. However, there wasn’t signification association between nightshifts and BC risk (P.Value = > 0.05). This could be relevant to the fact that occupation and working hours per week are associated with increased BC risk mainly in developing countries where stress, unhealthy lifestyle and bad work-place environment might play a role. Nightshift on the other hand, was not associated to BC in this study. Therefore we suggest a more constructed study on a larger sample size. Hence we conclude that, risk to breast cancer increases among working women and increased working hours per week. This is probably due to unhealthy lifestyle and work-places. Nightshifts, however, is not associated with risk to BC in this study.

Key wards: Breast cancer, working women, number of working hours per week, nightshifts, employment.

Introduction:
Breast cancer (BC) is the second most common cancer in the world after lung cancer. According to GLOBOCAN 2012, it is the most frequent cancer among women with an estimated 1.67 million new cancer cases diagnosed in 2012 (25% of all cancers) [1]. In Sudan BC is by far the most common cancer in women [2]. There are few known factors that influence BC risk that has been previously investigated. Employment and the number of working hours per day had shown benefits on health outcomes including people without disease and women in particular [3, 4, 5, 6, 7, 8]. Women working 1–19 hours per week had significantly higher functional well-being than women who are not working [9]. Moreover, women working more than 20 hours per week are not associated with higher functional well-being [9]. Nightshifts work, on the other hand, attracted public and scientific attention regarding its carcinogenesis. In 2007, the International Agency for Research on Cancer (IARC) classified ‘shift work that involves circadian disruption’ as probably carcinogenic to human (Group 2A) based on sufficient evidence from experimental study but limited evidence on epidemiological studies.
[10]. Pesch *et al* in 2010, stated that long-term night work is associated with a modestly, but not significantly, increased BC risk, while having ever done night work was not [11]. In a study by Franzeze and Nigri in 2007, who compared five studies on nightshifts as a possible risk factor for BC, they found that BC risk increases among those who do nightshifts and it was significantly increased among nurses [12]. That is why; they recommended that nurses who frequently attend night shifts should undergo strict and periodical BC screening. The theory behind night-shifts and cancer is based on the effect of melatonin. It is known that melatonin is a regulator of the hypothalamic-pituitary-gonadal axis, and the effect of melatonin on reproductive hormones, including estrogen, has been considered a primary mechanism by which nightshifts work may be associated with BC risk [13, 14]. While some epidemiological studies had shown possible association between nightshifts and BC, others showed null association [15]. On a meta-analysis by [16], concluded that, there is insufficient evidence for a link between night-shift work and BC risk.

We are here in aimed to study the correlation of employment, working hours per week and nightshifts as potential carcinogenic risk factors in a group of Sudanese women who has BC compared with healthy controls.

Materials and methods:

*Study area:* Randomly selected cases were recruited from Radiation and Isotope Centre of Khartoum (RICK). Matched controls were recruited from Omdurman Maternity hospital.

*Study design:* This is a case control study that took a period of one year. A structured questionnaire was designed to obtain data on occupation, working hours per day and nightshifts.
Study population: The study included 100 cases and 50 controls, all were females. Mean age was 46.5 years old.

Statistical method: Collected data were then analysed using Statistical Packages for Social Sciences (SPSS) program. Results were given in percentages and P-values which were calculated using Chi-square test. P value of < 0.05 was considered significant. The Chi-square tests was used to test the association between each risk factor under study and its relation to BC. Samples used in this study were random samples all interpretations were independent of each other. The null hypothesis emphasised the independence of the variables risk factors under consideration.
Results:

Eighty six percent of the cases were housewives and 14% were employed in different sectors. For the controls; 72% were housewives and 28% were employed (Table. 1). Our results showed significant association between employment and BC ($P.Value = 0.03$). In patients group 22% works 7 hours a week, 41% works 14 hours per week, 29% works 21 hours per week and 8% works 28 hours a week. In control group; 4% works 7 hours per week, 14% works 14 hours per week, 25% works 21 hours a week and 7% works 28 hours per week. In cases and controls groups, the number of working hours per day ranged between 1-4 hours, which is between 7-28 hours per week showing stronger significant association with BC ($P.Value = 0.02 < 0.05$) (Table.2). In patients group; (96%) didn’t have nightshifts in their work, only (4%) had nightshifts. In control group; (96%) didn’t have night shift while the rest who were nurses (4%) had nightshifts. For this group there was no significant association between nightshifts and BC risk ($P.Value = > 0.05$) (Table. 3).

Table.1

<table>
<thead>
<tr>
<th>GROUP</th>
<th>Occupation</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case</td>
<td>House Wife</td>
<td>86</td>
<td>86.0%</td>
</tr>
<tr>
<td></td>
<td>Employees</td>
<td>14</td>
<td>14.0%</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>100</td>
<td>100.0%</td>
</tr>
<tr>
<td>Control</td>
<td>House Wife</td>
<td>36</td>
<td>72.0%</td>
</tr>
<tr>
<td></td>
<td>Employees</td>
<td>14</td>
<td>28.0%</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>50</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

In patients group; (86%) were house wives and (14%) were employed. In control group; (72%) were house wives and only (28%) were employed. The association between employment and BC ($P.Value = 0.03 < 0.05$).
In patients group 22% works 7 hours a week, 41% works 14 hours per week, 29% works 21 hours per week while 8% works 28 hours a week. In control group; 4% works 7 hours per week, 14% works 14 hours per week, 25% works 21 hours a week and 7% works 28 hours a week. There is a significant statistical association between working hours and breast cancer ($P.Value = 0.02 < 0.05$).

<table>
<thead>
<tr>
<th>GROUP</th>
<th>Working Hours/Day</th>
<th>Frequency</th>
<th>Working Hours/week</th>
</tr>
</thead>
<tbody>
<tr>
<td>CASES</td>
<td>1</td>
<td>22</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>41</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>29</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>08</td>
<td>28</td>
</tr>
<tr>
<td>CONTROLS</td>
<td>1</td>
<td>04</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>25</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>07</td>
<td>28</td>
</tr>
</tbody>
</table>
Table.3

<table>
<thead>
<tr>
<th>GROUP</th>
<th>Night Work</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case</td>
<td>Yes</td>
<td>04</td>
<td>04.0%</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>96</td>
<td>96.0%</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>100</td>
<td>100.0%</td>
</tr>
<tr>
<td>Control</td>
<td>Yes</td>
<td>02</td>
<td>04.0%</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>48</td>
<td>96.0%</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>50</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

In patients group; (96%) didn’t have nightshifts in their work. Only (4%) had nightshifts. In control group; (96%) didn’t have night shift while the rest of them (4%) had. There was no significant statistical correlation between nightshift and breast (\( P.Value = > 0.05 \))
Discussion:

Breast cancer is the commonest cancer in women worldwide. The incidence of breast cancer increases with age. In this study the mean age was 46.5 years old, which is young compared to BC incidence age worldwide, however common in developing countries. In fact, there is heterogeneity on the definition of young women in the literature. According to various studies, young women are defined by an age under 35, under 40 years, or simply premenopausal status [17, 18]. This study showed that working Sudanese women are more exposed to BC more than non-working women. This could be related to their work-place environment. It is known that a good welfare system depends on health and well-being of the work-place [19]. The work place could be of a particular relevance to cancer risk in developing countries where cancer mortality is growing [20]. The enforcement of hazard control in work places is weak and worker organizations does not ensure obedience with standards required for healthy and save work environment [21]. Therefore workers are usually exposed to carcinogens. Moreover non-genetic / pollutants factors (e.g. diet, lifestyle, infectious agents, water, soil and air pollutions) [22] plays a great role in exposure to cancer. In different studies in two African countries they found that most workforce work outdoors which exposes them to sunlight, and there is inappropriate management of waste or toxic substances that can affect the
environment and nearby residents [21, 23, 24]. These could be implicated on all developing countries including Sudan.

We also found that working for 7-28 hours per week increases BC risk. This finding agrees partially with Timperi et al., 2013 who found that women working 1–19 hours per week had significantly higher functional well-being. In Sudan it is observed that women with BC are obese and mostly occupy jobs that requires sitting and they do not do physical exercise [9]. These can hinder their well being and increases their risk to BC. In a cohort study by Patel et al., 2015, showed women who sit 6 or more hours a day during their leisure time have a 10% greater risk of developing any cancer compared with women who sit for fewer than 3 hours a day [25]. They also found that these women were more likely to develop certain site-specific cancers, such as invasive BC. It is biologically probable that time spent sitting is a risk factor for cancer due to its effects on increasing fat accumulation which has an impact on metabolic dysfunction [26, 27].

The study also showed that, nightshifts work was not associated with BC risk. This finding is different from that previously reported by Kolstad 2008 who observed limited evidence on association between nightshift work and BC [28]. However, in Pronk et al 2010 cohort there was a lack of association between nightshift work and BC risk [29]. Contrariwise to our findings on the lack of association between nightshifts and BC; Schernhammer et al., 2001 previously
reported that nightshifts are associated with moderately increased BC risk among the female nurses [30]. Different other epidemiological studies suggest an increased risk of BC especially among nurses [31]. This is not manifest in this study; this could be due to the small sample size of female nurses who included in the study. That is why we suggest a constructive study with bigger sample size on a population who works in different sectors like industrial, military and companies beside nurses.

WE CONCLUDE THAT EMPLOYMENT AND NUMBER OF HOURS SPEND IN SITTING IN THE WORK-PLACE INCREASE THE RISK TO BC. NIGHTSHIFT, ON THE OTHER HAND, WAS NOT ASSOCIATED WITH BC IN THIS STUDIED GROUP.

ACKNOWLEDGEMENTS:
THE AUTHORS ARE INDEBTED TO THE PARTICIPANTS ON THIS STUDY AND RADIATION AND \ISOTOPE CENTRE IN Khartoum (RICK), Sudan and Omdurman Maternity hospital. Support for this work was provided by private budget from the authors of the study. The paper was part of students dissertations conducted under the umbrella of AHFAD University for Women, Omdurman, Sudan,
References


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