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Original Research

Dynamics of Demographic Factors and Breast Cancer: Insights from a Comprehensive Study

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Abstract:
Background: This study employed a rigorous research design to investigate the relationships between marital status, educational attainment, age at menarche, and breast cancer prevalence within a diverse Kashmiri population. Understanding these associations is crucial for developing targeted interventions and public health strategies to address breast cancer disparities. **Methods:** Data was collected through a comprehensive questionnaire from a diverse Kashmiri population at SKIMS, examining marital status, educational attainment, and age at menarche among individuals diagnosed with breast cancer. Statistical analyses were employed to explore potential correlations and associations between these variables. **Results:** The analysis revealed a higher prevalence of breast cancer among married women (95.57%), suggesting potential influences from socioeconomic advantages, improved healthcare access, and healthier lifestyles within marital relationships. Lower educational attainment correlated with an increased incidence of breast cancer (64.65% with 8th grade or less), highlighting the role of socioeconomic factors. The study found the weak association between age at menarche and breast cancer risk, with 58.41% experiencing onset before the age of 12. **Conclusion:** This study illuminated the complex interplay between marital status, educational attainment, age at menarche, and breast cancer prevalence. The findings suggest heightened breast cancer prevalence among married women, potentially linked to socioeconomic factors. These insights underscore the need for tailored interventions to address breast cancer disparities and emphasize the multifaceted influences of demographic factors on disease outcomes

Keywords: Breast cancer prevalence, marital status, educational qualification, age at menarche, and socioeconomic factors.

Introduction:

Breast cancer, a complex and multifaceted health challenge, is profoundly influenced by various demographic and social factors that play pivotal roles in shaping the trajectory of the disease.[1-3] Understanding the interplay between these factors and breast cancer outcomes is crucial for developing effective strategies for prevention, early detection, and treatment. This study focuses on investigating the demographic characteristics, marital status, educational status, and age at menarche among patients diagnosed with breast cancer.

Demographic characteristics can significantly impact the stage at diagnosis, tumor characteristics, and adherence to diagnostic and treatment recommendations.[4] The dynamics of these characteristics change over time, and their influence on breast cancer outcomes necessitates thorough exploration. Numerous studies assessing women's knowledge levels have consistently highlighted insufficient awareness regarding breast cancer and early detection behaviors.[5-7] Specifically, investigations into the breast cancer knowledge of women have underscored that those with lower levels of understanding are less inclined to engage in early detection practices. This knowledge gap is recognized as a significant barrier to proactive health-seeking behaviors.[5-7] Additionally, fear of breast cancer has been identified as a notable deterrent to early detection behaviors, further emphasizing the complex interplay of psychological factors in healthcare decision-making.[8-10] Understanding the dynamics of social fear and inadequate knowledge levels among women at risk of breast cancer is crucial for the strategic planning of targeted interventions. Insights into these psychological

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and informational barriers can inform the development of tailored programs aimed at enhancing awareness and promoting early detection behaviors.[11] It is imperative to recognize and address these factors to optimize the effectiveness of interventions designed to encourage proactive health measures. Moreover, various socio-demographic characteristics have been reported to significantly influence breast cancer detection behaviors among women. Authors have consistently identified factors such as age, education level, marital status, income status, employment status, and family history of breast cancer as pivotal determinants.[12]

Marital status is a key social determinant that may influence a patient's support system, access to healthcare resources, and psychosocial well-being. Understanding the distribution of marital status among breast cancer patients provides valuable insights into the social context that can affect the journey of diagnosis, treatment, and recovery. Educational status is a critical determinant of health literacy, influencing individuals' awareness, understanding, and adherence to preventive practices and medical recommendations. Investigating the educational background of breast cancer patients contributes to a nuanced comprehension of the role of literacy in navigating the complexities of breast cancer care. Age at menarche, the onset of menstruation, is a biological milestone with potential implications for breast cancer risk. Changes in reproductive patterns over time may influence breast cancer incidence. Examining the age at menarche among breast cancer patients provides insights into hormonal and reproductive factors that contribute to the disease's etiology. Acknowledging the impact of these socio-demographic variables is essential for a comprehensive understanding of the factors influencing women's engagement in breast cancer detection behaviors. By recognizing the multifaceted nature of these determinants, healthcare interventions can be tailored to address specific challenges faced by diverse demographic groups, thus enhancing the overall effectiveness of breast cancer awareness and early detection initiatives.

Methods

To gather information for our study, we used a carefully designed questionnaire that was made specifically for this research. The questions were reviewed by experts to make sure they were precisely meeting the objectives of study. Before collecting actual data, we did pilot run of the questionnaire in the field to make sure it worked well. The questionnaire, which respondents filled out on their own, asked about questions like age, when they started and stopped their periods, marital status, how many children they have, education, and other important details.

Our research process had three main steps. First, we created the questionnaire with help from medical experts. Second, we tested the questionnaire to make sure it is precise. Third, we used a computer program called SPSS Version 17 to analyze the data we collected. This helped us make sense of the information and create graphs for a better understanding. To make sure our data was is exact, we took steps like using clear language in the questionnaire, having one person handle the interviews, building trust with the participants, keeping their information private, keeping careful records, and documenting our analysis process.

For other information, we looked at existing data from reliable sources. We used PubMed, a free database, to find references and summaries on medical topics. We also used the Indian Journal of Cancer and the National Cancer Registry Programme, which is run by the Indian Council of Medical Research. These sources provided important background information and data to support our study.

When we analyzed the data we collected, we organized it in a spreadsheet using Microsoft Excel. Then, we used a program called SPSS Version 20.0 to understand the data better. We expressed continuous data as percentages. We presented the information using bar and pie charts, which make it easier to see and understand.

Results

In this section, the results of the study will be described:

Table 1: Distribution of studied patients as per marital status across different districts

District	Frequency (%)		
	Currently Married	Divorced	Never married
Srinagar	24(21.12%)	0	1 (0.88%)
Budgam	16(14.15%)	0	3 (2.65%)
Ganderbal	8(7.07%)	0	0
Anantnag	21(18.58%)	0	0
Pulwama	8(7.07%)	0	0
Kulgam	3(2.65%)	0	0
Shopian	2(1.76%)	0	0
Baramulla	12(10.61%)	0	0
Kupwara	12(10.61%)	1(0.88%)	0

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Ramban	2(1.76%)	0	0
Overall	**108 (95.57%)**	**1(0.88%)**	**4 (3.54%)**

In the demographic analysis across different districts, distinct marital status patterns emerged. In Srinagar, a notable 21.12% of the population was currently married, while a minimal 0.88% have never married, and there were no reported divorces. Moving to Budgam, 14.15% of individuals were currently married, with 2.65% having never married, and no reported divorces. Ganderbal exhibits a current marriage rate of 7.07%, with no reported divorces or individuals who have never married. Anantnag reported an 18.58% marriage rate, with no divorces or individuals who have never married. In Pulwama, 7.07% of the population was currently married, with no reported divorces or individuals who have never married. Kulgam indicated a 2.65% current marriage rate, with no reported divorces or individuals who have never married. Shopian reported a 1.76% current marriage rate, with no reported divorces or individuals who have never married. Baramulla showed that 10.61% of individuals were currently married, with no reported divorces or individuals who have never married. Kupwara had a current marriage rate of 10.61%, a 0.88% divorce rate, and no individuals who have never married. Finally, Ramban reported a 1.76% current marriage rate, with no reported divorces or individuals who have never married. Overall, the collective data revealed that 95.57% of the studied population was currently married, 0.88% had experienced divorce, and 3.54% had never married. These findings provide a comprehensive overview of the marital status distribution within the studied population across different districts and suggest that breast cancer is more prevalent in married females (95.57%) as compared to divorced (0.88%) or unmarried females (3.54%).

Table 2: Distribution of the studied population as per education status

	Frequency (%)				
District	**8th Grade or less**	**Beyond 8th Grade**	**High School or GED**	**Master's degree**	**Ph.D,M.D or other advanced degree**
Srinagar	9(7.96%)	10(8.84%)	6(5.3%)	0	0
Budgam	14(12.38%)	4(3.54%)	1(0.88%)	0	0
Ganderbal	4(3.53%)	4(3.53%)	0	0	0
Anantnag	19(16.8%)	2(1.76%)	0	0	0
pulwama	4(3.53%)	3(2.65%)	1(0.88%)	0	0
Kulgam	3(2.65%)	0	0	0	0
Shopian	1(0.88%)	1(0.88%)	0	0	0
Baramulla	6(5.31%)	6(5.31%)	0	0	0
Kupwara	11(9.37%)	2(1.76%)	0	0	0
Ramban	2(1.76%)		0	0	0
Overall	**73 (64.65%)**	**32 (28.32%)**	**8 (7.08%)**	**0**	**0**

Table 2 provides a comprehensive overview of the educational status distribution within the studied population across various districts. The educational characteristics are delineated based on distinct categories, including individuals with an educational attainment of 8th grade or less, those beyond 8th grade, high school or GED, master's degree, and individuals holding a Ph.D., M.D., or other advanced degree. In Srinagar, 7.96% of the population fell within the category of 8th grade or less, while 8.84% had an educational attainment beyond the 8th grade. Six individuals (5.3%) have completed high school or earned a GED.Budgam exhibited a diverse educational distribution, with 12.38% having an educational attainment of 8th grade or less, 3.54% beyond 8th grade, and 0.88% holding a high school or GED qualification.Ganderbal showed 3.53% of the population with an educational attainment of 8th grade or less, and an equal percentage beyond 8th grade. No individuals reported completing high school or holding a master's degree or higher in this district.In Anantnag, the educational distribution included 16.8% with an attainment of 8th grade or less and 1.76% beyond 8th grade.Pulwama illustrated 3.53% with an educational attainment of 8th grade or less, 2.65% beyond 8th grade, and 0.88% with a high school or GED qualification. Kulgam showed 2.65% with an educational attainment of 8th grade or less, and no individuals beyond 8th grade. No individuals in this district reported completing high school.Shopian indicates 0.88% of the population with an educational attainment of 8th grade or less, and an equal percentage beyond 8th grade. Baramulla exhibited 5.31% with an educational attainment of 8th grade or less, and an equal percentage beyond 8th grade while as no individuals in this district reported completing high school. Kupwara

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illustrated 9.37% with an educational attainment of 8th grade or less, and 1.76% beyond 8th grade. Ramban showed 1.76% with an educational attainment of 8th grade or less, and no individuals beyond 8th grade. The educational distribution analysis across all districts reveals that 64.65% of the studied population has an educational attainment of 8th grade or less, while 28.32% have surpassed the 8th-grade level. A minimal 7.08% have completed high school or earned a GED, and none reported possessing a master's degree or any other advanced degree. The data suggests a potential correlation between lower educational attainment and an increased incidence of breast cancer within this population, emphasizing the importance of targeted interventions and awareness programs.

Table 3: Distribution of studied population as per age at which menstrual cycle started

Frequency (%)			
District	Never	<12	>12
Srinagar	0	12(10.61%)	13(11.50%)
Budgam	0	11(9.73%)	8(7.07%)
Ganderbal	0	4(3.53%)	4(3.53%)
Anantnag	0	14(12.38%)	7(6.19%)
Pulwama	0	2(1.76%)	6(5.31%)
Kulgam	0	3(2.65%)	0
Shopian	0	1(0.88%)	1(0.88%)
Baramulla	0	8(7.07%)	4(3.53%)
Kupwara	0	9(7.96%)	4(3.53%)
Ramban	0	2(1.76%)	0
Overall	**0**	**66 (58.41%)**	**47 (41.59%)**

The table 3 presents the distribution of the studied population across different districts concerning the age at which their menstrual cycle started. In Srinagar, 10.61% experienced menarche before the age of 12, while 11.50% had their menstrual cycle start after the age of 12. Similarly, in Budgam, 9.73% had menarche before 12, and 7.07% experienced it after 12. In Ganderbal, none of the individuals reported that their menstrual cycle had not started, with 3.53% experiencing it before the age of 12 and another 3.53% after the age of 12.Similarly, in Anantnag, none fell into the "Never" category, with 12.38% having their menstrual cycle start before the age of 12 and 6.19% after the age of 12. In Pulwama, none of the individuals reported never experiencing menstruation, while 1.76% had their menstrual cycle start before the age of 12, and 5.31% initiated menstruation after the age of 12.For Kulgam, all individuals reported experiencing menstruation, with 2.65% having their menstrual cycle start before the age of 12.In Shopian, none of the individuals reported never experiencing menstruation, 0.88% had their menstrual cycle start before the age of 12, and an additional 0.88% initiated menstruation after the age of 12.Baramulla had none of the individuals reporting never experiencing menstruation, 7.07% had their menstrual cycle start before the age of 12, and 3.53% initiated menstruation after the age of 12. In Kupwara, none of the individuals reported never experiencing menstruation, 7.96% had their menstrual cycle start before the age of 12, and 3.53% initiated menstruation after the age of 12.For Ramban, none of the individuals reported never experiencing menstruation, 1.76% had their menstrual cycle start before the age of 12, and none initiated menstruation after the age of 12. Overall, in the studied population, none of the individuals reported never experiencing menstruation. Of the total population, 58.41% had their menstrual cycle start before the age of 12, while 41.59% initiated menstruation after the age of 12. These findings indicate that the age at which the menstrual cycle starts may not have a substantial impact on breast cancer. Among the studied population, 58.41% of females experienced the onset of their menstrual cycle before the age of 12, while 41.59% had their menstrual cycle start after the age of 12.

Discussion

The present study, encompassing a diverse population, elucidated that 95.57% were currently married, 0.88% had undergone divorce, and 3.54% had never married. The data highlighted a nuanced distribution of marital status across various districts, unveiling a notable association between marital status and breast cancer prevalence. Specifically, married females exhibited a higher prevalence (95.57%) compared to divorced (0.88%) or unmarried females (3.54%). The elevated prevalence of breast cancer among married women may be attributed to factors such as their generally higher socioeconomic status, which facilitates improved access to healthcare, and the promotion of healthier lifestyle behaviors within the marital context, including regular screenings and balanced diets.[14,15] The support system

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inherent in marriage, both emotionally and psychosocially, could contribute to lower stress levels, potentially impacting the risk of breast cancer. Additionally, reproductive patterns among married women, such as earlier childbirth and extended breastfeeding, may also play a role in influencing breast cancer risk.[15] However, it's crucial to acknowledge the complexity of this relationship, as divergent findings exist in the scientific landscape. Some epidemiological studies propose higher breast cancer rates among unmarried individuals, challenging the notion that marriage universally guards against the disease.[16,17] Variations in the impact of marital status on breast cancer incidence are attributed to diverse factors such as race, cultural differences, and temporal changes.[18,19]Additionally, the debate on the influence of marital status on breast cancer survival complicates the narrative. While some earlier studies including ours suggest a positive correlation between marital status and long-term prognosis, a recent systematic reviews and meta-analyses indicate that this relationship becomes statistically insignificant after adjusting for population and age-related factors.[20] The inconsistency in results is attributed to the heterogeneity of the studied populations and the presence of confounding variables, emphasizing the need for comprehensive and nuanced analyses in understanding the intricate interplay between marital status and breast cancer outcomes.

The findings of the present study, highlighting a significant proportion of the population with educational attainment of 8th grade or less (64.65%), and a minimal percentage with high school completion (7.08%) or advanced degrees, suggest a potential correlation between lower educational attainment and an increased incidence of breast cancer within this population. This observation aligns with the broader understanding that education is a key component of socioeconomic status (SES), and various reproductive, lifestyle, and behavioral factors associated with lower education levels may contribute to an elevated breast cancer risk.[21,22]This correlation is consistent with the study conducted by Hajian et al, where higher educational levels were associated with a lower risk of breast cancer after adjusting for confounding factors.[23]Additionally, a study in Brazil by Dos-Santos-Silva and colleagues identified a higher likelihood of late-stage breast cancer diagnosis among individuals with lower levels of education, reinforcing the link between educational attainment and breast cancer outcomes.[24]The complex relationship between education and breast cancer is further emphasized by recent research indicating that a high level of education is significantly associated with a decreased incidence of high-risk ductal breast cancer among postmenopausal women, specifically involving factors like lymph-node positivity, larger tumor size, higher histologic grade, and estrogen-receptor negativity.[25]These collective findings underscore the importance of considering educational factors in breast cancer risk assessment and the need for targeted interventions and awareness programs, particularly for populations with lower educational attainment. Understanding and addressing the socioeducational determinants of breast cancer risk can inform public health strategies aimed at reducing disparities in breast cancer outcomes.

The findings from the present study, indicated that the age at which the menstrual cycle starts may not have a substantial impact on breast cancer, align with existing research on the weak association between age at menarche and breast cancer risk.[26,27]In the studied population, 58.41% of females experienced the onset of their menstrual cycle before the age of 12, while 41.59% had their menstrual cycle start after the age of 12. The weak association between age at menarche and breast cancer risk has been reported in previous studies. For instance, Hsieh et al. found that a 10% reduction in risk was estimated for each 2-year delay in menarche, suggesting a modest impact on breast cancer risk. This translates to an odds ratio of approximately 0.8 between the earliest and latest categories of menarche, demonstrating a relatively minor influence on breast cancer risk.[27]Moreover, the study by Kotsopoulos et al. highlighted a strong inverse relationship between age at menarche and breast cancer risk in BRCA1 carriers but found no significant effect in BRCA2 carriers.[28]The discrepancies in findings may be attributed to differences in study designs, such as the use of a matched case-control design and the exclusion of subjects with missing information on age at menarche. The present study's results, excluding a large protective effect of early age at menarche, contribute to the broader understanding of the nuanced relationship between age at menarche and breast cancer risk.The divergence in results underscores the complexity of hormonal factors and suggests that other variables may influence the relationship between menopause and breast cancer risk. These findings collectively emphasize the need for comprehensive analyses and consideration of various factors in understanding the intricate associations between reproductive factors and breast cancer risk.

Conclusion

The study provided valuable insights into the associations between marital status, educational attainment, and age at menarche with breast cancer prevalence. The data indicated a higher prevalence among married women, potentially linked to socioeconomic advantages, healthcare access, and healthier lifestyles within marriage. Lower educational attainment correlated with increased breast cancer incidence, aligning with socioeconomic determinants.

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The weak connection between age at menarche and breast cancer risk was reaffirmed, emphasizing the nuanced nature of this relationship. Divergent findings in the scientific landscape underscore the complexity of these associations, warranting comprehensive analyses. Overall, the study calls for targeted interventions and public health strategies to address breast cancer disparities among diverse populations.

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