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# A Cross Sectional Study to Understand Hepatitis B Vaccination Coverage among Staff and Students in a Medical College in South Kerala



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## ABSTRACT

### Background
Hepatitis B is a vaccine-preventable liver disease caused by the hepatitis B virus. It is transmitted when blood, semen, or another body fluid of a infected person enters the body of an uninfected individual. Healthcare Workers are at high risk for HBV infection. According to WHO, 5.9% of HCWs are each year exposed to blood-borne HBV infections corresponding to about 66,000 HBV infections in HCWs worldwide. Thus, vaccination among the health care workers is essential to protect themselves and protect patients. Hence we aim to study Hepatitis B vaccination coverage among healthcare workers and reasons for failure to vaccinate.

### Methods
A cross sectional study was conducted among staff and students in a Medical College at Pathanamthitta district Kerala. Study participants were selected by categorizing the population of a medical college and recruiting the required samples from each strata to meet the calculated sample size. Hepatitis B vaccination coverage was assessed using a semi structured questionnaire.

### Results
Among the 201 participants, 90.7% of doctors, 82.9% of nurses, 97.6% of medical students and 93.3% of house surgeons were vaccinated against hepatitis B. None of the cleaning staff were vaccinated. From our study the main reason for not taking vaccine was due to lack of awareness

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about vaccination against the disease, relaxed attitude towards vaccination and others reasons like lack of time.

**Conclusion**

Hepatitis B vaccination coverage was 66.6% in this study. The role the study participants have in a hospital is significantly associated with the vaccination status. Hospital policies have a major role in maintaining high vaccination coverage of their staff. Awareness about vaccination and availability of vaccine at the public health facility can add to the coverage.



**Keywords:** Hepatitis B, Vaccination Coverage, Awareness, Policies.

## INTRODUCTION

Hepatitis B is a vaccine-preventable liver disease caused by the hepatitis B virus (HBV). It is transmitted when blood, semen, or another body fluid of a infected person enters the body of an uninfected individual.[1] This usually occurs through sexual contact; sharing needles, syringes, or other drug-injection equipment; or from the gestational parent to baby during pregnancy or at birth.[1]

Every year a million deaths occur worldwide due to Hepatitis B infection, thus being the leading cause of morbidity and mortality, not only because of the acute illness but also due to its chronic sequelae like chronic hepatitis, cirrhosis and hepatocellular carcinoma.[2]

Globally about 257 million persons are infected with chronic hepatitis B (CHB), resulting in 887,000 deaths annually. More than 90% of the deaths and disability as a result of viral hepatitis can be attributed to CHB and chronic hepatitis C infections.[3]

In India about 50 million people are chronic HBV carriers and the prevalence of hepatitis B surface antigen (HBsAg) ranges between 2 to 8% in general population. India belongs to "intermediate to high endemicity" group of countries for hepatitis B surface antigen constituting approximately 11% of the estimated global burden. Every year, around 115, 000 Indians die due to HBV infections and complications.[4]

Healthcare Workers are at high risk for HBV infection because of particular exposure of mucus membranes and breached skin to blood. HBV-infected HCWs also pose a potential risk for patients as there is documented risk of HBV transmission to patients from treating doctors or medical staff. According to WHO, 5.9% of HCWs are each year exposed to blood-borne HBV infections corresponding to about 66,000 HBV infections in HCWs worldwide.[5]

About 70% of HCWs in hyper- or intermediate endemic countries have been reported to have needle-stick injuries.In HCWs who sustained injuries from needles contaminated with blood containing HBV, the risk of developing clinical hepatitis varies from 1-6% to 22-31% depending on HBeAg (positive or negative) of the source. HBV infections in HCWs without a history of exposure might be due to direct or indirect blood or body fluid exposures that have led to inoculation of HBV in the mucosal surfaces or cutaneous scratches. Reports from India indicate that only 16-60% of HCWs have received complete HBV immunization.[5]

Hepatitis B vaccine is the first anticancer vaccine which has outstanding record of safety and effectiveness. It is 95% effective in preventing children and adults from developing chronic infection.[6]

In India, hepatitis B vaccination was launched in the year 2002 mainly in urban India and in 2003, it extended to 33 additional rural districts. Finally the Indian National Policy (UIP) on immunization recommended vaccinating the children with three doses of hepatitis B along with the other six vaccine preventable diseases (VPDs).[4]

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Universal immunization program (UIP) in India is one of the centrally sponsored programmes that aim to immunize every child in the country against VPDs. The current immunization schedule in India includes a birth dose within 24 hours for all the institutional deliveries to prevent the perinatal transmission. But irrespective of the birth dose, three doses are given to the new born at 6, 10 and 14 weeks along with oral polio virus (OPV) and DPT for a complete immunization against hepatitis B taking care of the large number of non-institutional births.[4] For adults three standard doses of recombinant HBV vaccine should be administered intramuscularly in the deltoid region, preferably with a 1-1.5 inch long needle at a 0, 1, and 6 month schedule.[7]

A quantitative test of anti HBs antibodies is a good measure to asses protection against Hepatitis B after vaccination. If the titer of antiHBs is > 10UI/L no hepatitis B vaccine booster dose and no further health status check are necessary. If the titer of antiHBs is < 10UI/L, a fourth (booster) dose of Hepatitis B vaccine is recommended, along with further evaluation of antibody titre after two months. Studies reported that the antiHBs antibody titre ≥ 10 IU/L can immunize from hepatitis for upto 10 years even after 30 years from last dose.[8]

Thus, vaccination among the health care workers is essential to protect themselves and protect patients. This study aims to estimate the coverage of hepatitis B vaccination among health care workers and reason for not vaccinating yet.

## MATERIALS AND METHODS

The current Cross sectional study was conducted from September 2023 to November 2023 on Healthcare workers in Mount Zion Medical College, Adoor, Pathanamthitta, Kerala.

### Sampling Method

Probability proportional sampling/PPS is an unequal probability sampling technique, in which the probability of selection for each sampling unit in the population is proportional to an auxiliary variable.

### Sample Size

A prevalence of 49.6% was taken from a study done to evaluate HBV immunization status and anti-HBs titer among HCWs in 2015 in Dr Sampurnanand Medical College Rajasthan by Vishal Batra et al.[5]

Substituting the values in the formula below and taking precision at 7%,

$N= Z^2pq/d^2$

$N= (1.96)^2 \times 49.6 \times 50.4/ (7)^{[2]}$

The minimum sample required is calculated as 196.

### Inclusion Criteria

Healthcare workers-house surgeons, doctors, nurses, medical students, cleaning staff.
Both male and female.
Healthcare workers who are cooperative and give consent for the study.

### Exclusion Criteria

HealthCare Workers not willing to participate.

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### Study Procedure

Each participants was clearly explained the purpose of the study and consent was taken. They were interviewed using a pre tested semi structured questionnaire and information on vaccination coverage against Hepatitis B was collected. The data was entered and analysed using Microsoft office excel 2010 and SPSS.



### Ethical Consideration

Consent was taken before data collection and was guaranteed to maintain anonymity of our study participants.

## RESULTS

Out of the total 201 participants, 68.2% were females and 31.8% were males. Based on the sampling, 26.8% of our study subjects were doctors followed by MBBS student (41.8%), nurses (20.4 %), house surgeons (7.5%) and cleaning staff (3.5 %). 11.4 % of study participants had exposure to blood and blood products (fig 1). 89.1 % were vaccinated against hepatitis B (fig 2). Out of the unvaccinated participants (N=21), 66.6% did not vaccinate due to lack of awareness, 14.6% thought vaccine was not necessary, 18.8% due to other reasons like lack of time , forgot to take vaccine and unavailability of vaccine at that time of visiting the health facility.

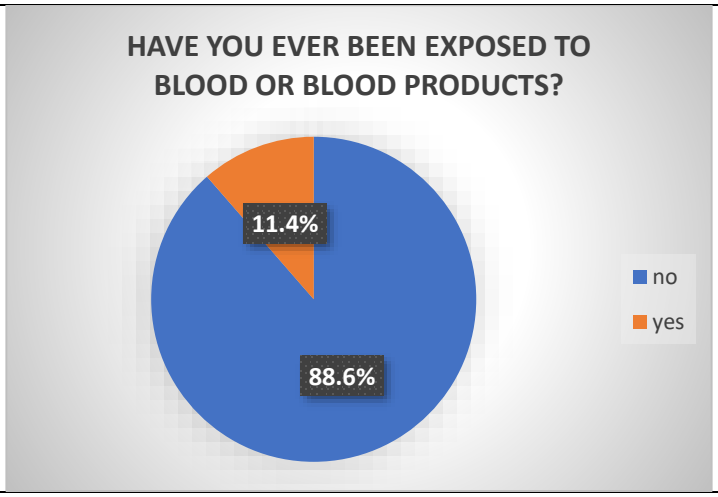


***Figure 1: Distribution of Study Participants According Exposure To Hepatitis B Virus***

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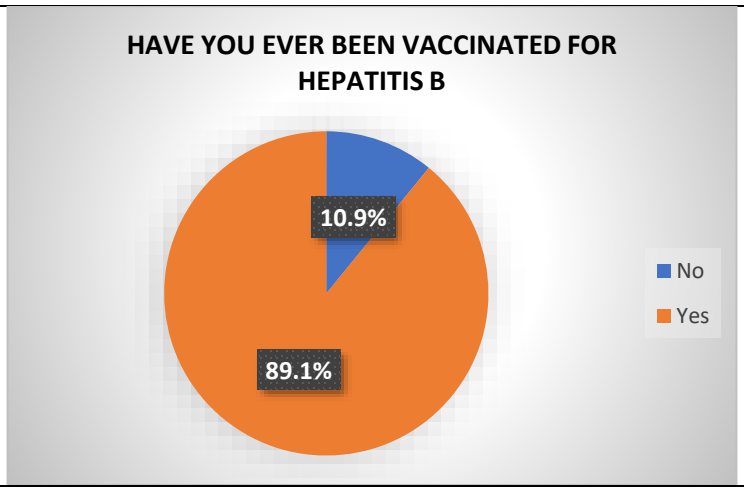


***Figure 2: Distribution Of Study Participants According To Vaccination Against Hepatitis B.***

| Parameters | Variables | Frequency | Percentage |
|---|---|---|---|
| Dose of hepatitis B taken (N=201) | All three doses | 134 | 66.6 |
| | First and second dose | 32 | 15.9 |
| | First dose only | 14 | 6.9 |
| | None | 21 | 10.4 |
| Antibody titre checked (N=134) | Yes | 15 | 11.2 |
| | No | 119 | 88.8 |
| Antibody titres >10 mIU/ml (N=15) | Yes | 13 | 86.7 |
| | No | 2 | 13.3 |

***Table 1: Distribution of study participants according to vaccination profile***

Table 1 shows that, out of the 180 participants who took vaccination, only 79.4% took all three doses, 17.9% took first and second doses and 7.8% took first dose only. Only 9 % among the completely vaccinated individuals have tested to check for the adequacy of antibody titer. The study reveals that the nature of work of the study participants in the health facility is associated with the vaccination against hepatitis B (table 2).

| Vaccinated Against Hepatitis B | Occupation | | | | | Total | Chi Square | P Value |
|---|---|---|---|---|---|---|---|---|
| | Doctors | Nurses | Medical Students | House Surgeons | Cleaning Staff | | | |
| Yes | 49 | 34 | 82 | 14 | 0 | 179 | 65.294 | 0.000 |
| No | 5 | 7 | 2 | 1 | 7 | 22 | | |
| Total | 54 | 41 | 84 | 15 | 7 | 201 | | |

***Table 2: Table showing the association between job responsibility of study participants at the health facility and vaccination status***

## DISCUSSION

In the present study, to understand the Hepatitis B vaccination coverage among healthcare workers in a private medical college in Pathanamthitta district, Kerala, a total of 201 healthcare workers were included.

In our study majority of the participants, 66.6 % were completely vaccinated against hepatitis b as per the recommended guidelines. In a previous study conducted in 2021 at a tertiary care hospital in Palakkad district 74.6% of the study subjects were vaccinated.[9] Only 62.67 % of study participants received all three doses of hepatitis B vaccine in a study conducted in Central India.[10]



Among the participants 90.7% doctors, 82.9% nurses, 97.6% medical students and 93.3% house surgeons were vaccinated whereas and 100% of cleaning staff were not vaccinated. The job profile of the study participants had a significant association with their vaccination status ($p<0.001$). Higher professional status had better vaccination coverage and maybe due to the better health literacy. A study by Rashmi M et. al also supports our finding that the vaccination coverage was highest among doctors as compared to other working in the health sector.[11]

From our study the main reason for not taking vaccine was due to lack of awareness, participants thought vaccination was not necessary, unavailability of vaccine at public sector facility at the time of visit and others reasons like lack of time. In a study by Manrai M et. al. the reasons for not getting vaccinated identified were unaware of existing organizational polices(36%), too busy to be vaccinated (32%), inconvenience due to far distance (18%) and worried about the side –effect (14%).[12]

Among the vaccinated participants, only 11% of the participants have tested the antibody titer for Hepatitis B antigen after 2 months of taking third dose of vaccine and among the tested 13.3% had titers below the recommended value. In a cross-sectional study conducted in the Department of Microbiology, Government TD Medical College, Alappuzha, Kerala, the vaccination rate was 72.6%. Majority of the participants, i.e. 83.5% of doctors, 81.1% of nurses, 69.7% of students, and 21.4% of technicians, had taken all the three doses of hepatitis B vaccine. Of the participants whose titer was checked, 12.3% had a non-protective titer of <10 mIU/ml.[13]

The exposure to needle stick injury was 11.4% from this study. From a study done by Subodh R. Thote, et al 32.5% had exposure to blood/body fluid via needle stick injury at least once since they started their training in the health facility.[14]

## CONCLUSION

It is well-established that the HBV vaccine is highly protective and that any person who performs tasks involving contact with blood, blood-contaminated body fluids, or sharps should be vaccinated against hepatitis B. All HCWs should be vaccinated against HBV, with a standard vaccination schedule.

Hospital policies like vaccinating new medical students and new employees were the main factors responsible for high vaccination coverage among healthcare workers and must be reinforced. Awareness regarding the importance of vaccination among all levels of healthcare staff should be a focus of action. It is possible to have low antibody titer even if fully vaccinated and thus measuring antibody titer against Hepatitis B, taking booster dose and screening for Hepatistis B infection should be made compulsory among healthcare workers.

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# A prospective study on prevalence of different breast pathologies and its epidemiological determinants in catchment area of tertiary care health facility in Raigad District



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## ABSTRACT

**Background**
Breast is associated with a lot of benign and malignant conditions. Apart from genetic factor, a lot more contribute to the onset of breast diseases. Re-searching in to those known and unknown factors always contribute to a deeper knowledge and validate the existing findings. One of the objectives of the Global NCD Action Plan 2013-2025 is to reduce modifiable risk factors for NCDs.

**Methods**
A community based study using self designed questionnaire was conducted to get an idea about the prevalence and the epidemiological determinants of breast pathologies.

**Results**
Diet and anthropometry had an influence on the subject under study.

**Conclusion**
Sedentary life styles as with other modern epidemics contribute to the occurrence of breast diseases. Creating awareness and motivation to choose a healthy living is the key to its control.

**Keywords:** Breast, Epidemiology, Anthropometry.

## INTRODUCTION

Breast is a modified sweat gland – modified apocrine gland made up of 15-20 lobules of glandular tissue embedded in fat. Fat accounts for its smooth contour and most of it bulk. Breast begins to develop as early as the fourth week as a down growth from a thickened mammary ridge (milk line) of ectoderm along a line from the axial to the inguinal region. Lobule formation occurs only in the female breast and does so after puberty. During pregnancy alveoli bud off from the smaller ducts and the organ usually enlarge significantly in preparation for lactation. When lactation ceases there is involution of secretory tissues after menopause progressive atrophy of lobes and ducts takes place.[1]

**Original Research Article**



Breast is associated with a lot of benign and malignant conditions. Most conditions of the breast are benign. Benign breast diseases are made up of a heterogeneous group of lesions that have diverse symptoms or may be detected as incidental microscopic findings. They are mostly seen in young individuals with a rising incidence from second decade of life and which peaks at fourth and fifth decade. In women between adolescence and the mid 20's the lobules and stroma in the breast may respond to hormonal stimuli in an exaggerated fashion with the development of single and multiple palpable fibroadenomas. Benign processes may be completely asymptomatic or have a variety of clinical manifestations such as palpable nodularity, thickening, mass, pain, inflammation or nipple discharge. Up to 30% of women suffer from benign breast diseases in anytime of their life.[2-4] Some of the benign diseases of the breast are fibroadenoma, mastitis, chronic subareolar abscess, tuberculosis of the breast, retromammary abscess, breast engorgement, mondor's disease, Paget's disease of the breast and galactocele.[5,6]

Mumbai population based cancer registry reveals the leading cancer sites among females are breast (28.8%) followed by cervix uteri (7.7%), ovary (6.9%), lung (5.0%) and gall bladder (3.5%). In Mumbai, approximately 2000 to 2500 new cases are detected every year and 52% of them are below 50 years of age.[7] Apart from the changing trend of cancers which was evident from a decade ago, the increase in number of cases is alarming.

The rising numbers of breast cancer cases are a result of changing lifestyle in the population due to urbanization. Physical inactivity, dietary pattern, duration of breast feeding, age at marriage and first child birth are few factors which have a bearing on breast diseases and are influenced by acculturation. This study assesses the magnitude of breast pathology and proportion of modifiable risk factors of carcinoma breast in the population.

## MATERIALS AND METHODOLOGY

This is a community based study conducted between January 2018 to September 2019 in two nodes of Panvel City Municipal Corporation, Raigad, Maharashtra. With the help of pre-designed and pre-tested self developed questionnaire which was pilot tested, data was collected using multi stage random sampling method. 369 women who were 35 years and above, irrespective of marital status and parity and without any known breast pathologies were enrolled in the study. The questionnaire collected general and socio-demographic information of the study participants, menstrual history, obstetric and breastfeeding history, contraceptive history, family history, present and past medical illness, presenting complaints of any breast pathologies, any addiction and dietary pattern. Data was analyzed applying descriptive and analytical statistics. The level of significance was set at 5% and p values less than 0.05 was treated as significant.

## RESULTS

Demographic details of the study population were as follows , 51.7% belonged to the age group of 35-39 years 39 followed by 26% between 40-44 years of age group, 9.7% in 45-49 age group, 8.3% in 50-54 age group, 1.6% in 55-59 age group and 2.75% are above 60 years of age (figure 1). 77.48% were Hindus by religion followed by 42 (11.26 %) Muslims, 22(5.9%) Boudha, 15(4.02%) Christians and 5(1.34%) Sikh. 69.9% have a educational back ground of high school and above, 75.9% were housewives, 89.3% belonged to class II and class I (figure 2).

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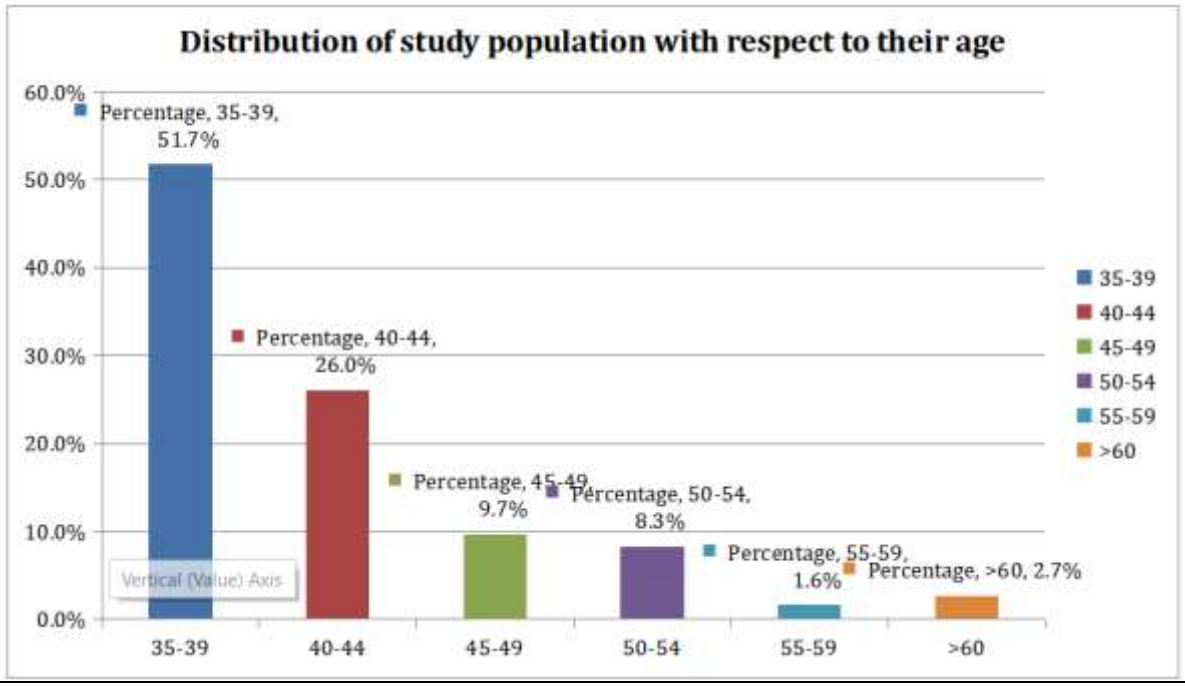


***Figure 1: Bar diagram showing distribution of the study population***

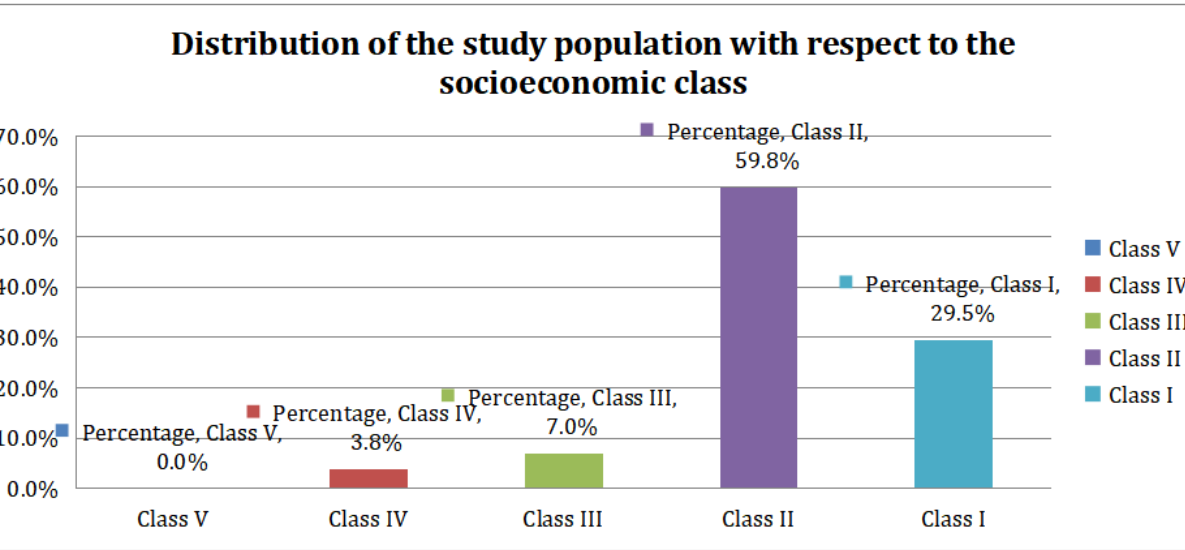


***Figure 2: Bar diagram showing the socioeconomic status based on modified B G Prasad's socioeconomic classification***

Breast pathologies identified from the study are shown in figure 3. Most of the breast pathologies were in the age group of 35-44 years.

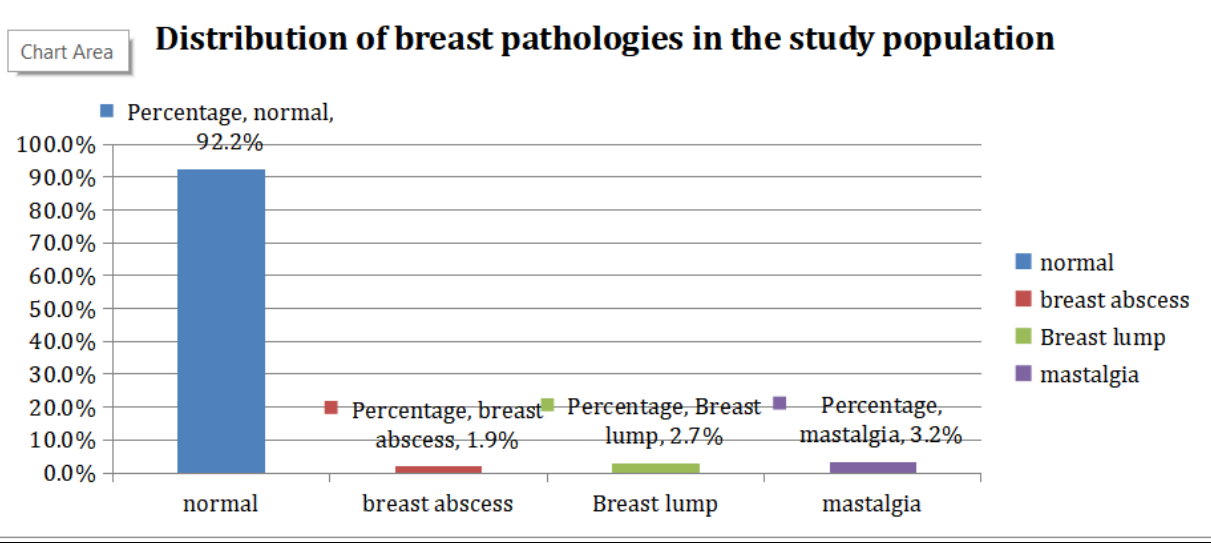


***Figure 3. Bar diagram showing the distribution of breast pathologies***

With respect to **risk factors** for breast pathologies, 4.82% had a early onset of menarche at an age lesser than 12 years, 90.6% got married at an age more than 18 years, 79.1% had the child birth before 25 years of age and 20.6% after 25 years of age, 99.7% of the study population had atleast one child and one women in the study was nulliparous, 89.2% had breast fed for two or more years and 10.5% for less than a year. The rate of abortion from the study was 38.6%. 86.6% of the study population were in the reproductive age group and 13.45% attained the menopause. The oral contraceptive use was 5.6%. 74.3% of the participants were non-vegetarians and 25.7% were vegetarians, 3.8% used tobacco in smokeless form. Anthropometric measurements of the study population were as follows : 27% of the study population had a BMI above the normal range, 44.2% had a waist circumference above 88cm and 52.8% had a waist to hip ratio(WHR) of more than 0.85(Table 1).

| Parameter | Normal | Cases | Chi square | P value |
|---|---|---|---|---|
| Middle school and below | 96 | 16 | 9.463 | 0.002097 |
| High school and above | 248 | 13 | | |
| Menarche at <12 years | 15 | 3 | 2.085 | 0.1488 |
| Menarche at ≥12 years | 329 | 26 | | |
| Age at delivery ≥25 years | 75 | 2 | 3.65 | 0.05606 |
| Age at delivery <25 years | 268 | 27 | | |
| Having > 2 children | 69 | 2 | 3.006 | 0.08296 |
| Having <2 children | 274 | 27 | | |
| Breastfed for Less than one year | 39 | 2 | 0.5457 | 0.4601 |
| Breastfed for More than one year | 304 | 27 | | |
| Non vegetarian | 251 | 26 | 3.898 | 0.04835 |
| Vegetarian | 93 | 3 | | |
| Contraceptive use Present | 21 | 0 | 1.876 | 0.1710 |
| Contraceptive use Absent | 323 | 29 | | |
| BMI>25 | 92 | 9 | 0.276 | 0.5994 |

**Original Research Article**

| | | | | |
|---|---|---|---|---|
| BMI< 25 | 252 | 20 | | |
| Waist circumference >88cm | 151 | 14 | 0.2081 | 0.6483 |
| Waist circumference < 88cm | 193 | 15 | | |
| WHR>0.85 | 177 | 21 | 4.718 | 0.02985 |
| WHR < 0.85 | 167 | 8 | | |

***Table 1: Shows various risk factors and its association***



## DISCUSSION

Researches were conducted in the past and in the present to know about the various diseases of the breast. Various aspects of breast diseases has been studied both at community level and in the hospital setting among both diseased as well as non diseased subjects exploring the etiology of such pathologies and a possible solution for the same.

Breast pathologies identified from the present study were mastalgia (3.2%), breast lumps (2.7%) and breast abscess (1.9%). Most of the breast pathologies were in the age group of 35-44 years. Breast lumps and breast abscess were more common with less educational background and in socioeconomic class I and II whereas cases of mastalgia were seen equally irrespective of educational status and socioeconomic status.

Findings are similar to a study conducted in Sion Hospital Mumbai among 500 women of child bearing age group. Most of the breast pathologies in the study population were noticed in third and fourth decade of life. The study reported that 1.8% of study population had breast abscess, 7.6% were cases of breast lump cases and no cases of mastalgia.[8] Pandey et al in a study conducted in Wardha, Mumbai among 8041 female patients attending the surgical outpatient department 6.15% had breast lumps, 1.1% of mastalgia and 0.8% breast abscess.[9]

The present study proved an association between education and risk for breast diseases and not with socioeconomic status. The p value of significance for educational status and breast diseases were 0.002097 when compared for a level below and above middle school of education. A study by Mohite V R et al showed that, cases of breast cancer are more among people with a higher degree of achievement of education which was significant at a p value of 0.002 and but was non-significant with socioeconomic status.[10] A study by Kamath R also concluded that, the incidence of breast cancer is positively related to a higher educational status with a p value of 0.30 but not with socioeconomic class.[11]

The number of cases of breast pathologies were more in women with lower educational status as mentioned and reason for the same maybe because of early treatment seeking behaviour of the people with higher educational attainment.

The present study did not reveal any association between early age at menarche and development of breast pathologies. The finding was similar to study by Lodha et al who also said that, attainment of menarche before twelve years of age does not have any relationship with onset of breast pathologies and the p value was 0.629.[12] However evidence supporting the early age at menarche as a cause for breast cancer was found in a study by Aich et al, conducted in a tertiary care hospital in Easter India with a significant p value of 0.001 on multivariate analysis.[13]

Age at first pregnancy is another factor implicated in the causation of breast pathologies. Later the pregnancy, more the risk for development of breast cancer. The present study showed that 79.1% of women had childbirth before 25 years of age and 20.6% at an age after 25 years. The study did not find any association between age at first pregnancy and onset of breast pathologies.

**Original Research Article**



Similar finding was seen in a study conducted in Mumbai that 80% women got married before the age of 25 years and 20% after 25 years of age, however they did not study about the association with risk of development of breast pathology.[14] Findings of the study by Lodha et al differs from present study in that, 61.9% of the study population had childbirth after the age of 25 years. The results of the study revealed that, age at first pregnancy after 25 years have a positive association with development of breast cancer and the finding was significant with a p value of 0.017.[12]

Indian culture demands the women to be married at an early age and for an early childbirth. The reason for 20.6% of the study participants being married at a age later than 25 years maybe because of pursuing higher education, career demands, or a change in outlook of Indian families because of acculturation.

Parity as a risk factor for breast pathologies has also been described. From our study 94.3% of the study population had two or more than two children, 5.4% had atleast one child. The study did not suggest any positive association between the two (chisquare of 3.006, p value of 0.0829).

In a study by Antony et al in Kerala, 89% of cases and 80% of controls had given birth to atleast one child and 20% cases and 10% controls have more than three children. The study reveals that parity has a role in development of breast pathologies with a significant p value of 0.010.[15]

Breastfeeding is a common practice in India. All women in this study had breastfed their children but only 89.2 % of the women had breastfed for more than a year. The study did not find any association between duration of breast feeding and breast pathologies. A case control study done in rural area of Maharashtra among newly diagnosed cases of breast cancer and an appropriate control revealed an OR of 10.43 for women who have never breast fed with a significant p value of 0.001.[16] In a community based 1:4 matched case control study carried out at Arpookara panchayat of Kottayam, Kerala among 20 cases and 80 controls revealed an increased risk for breast cancer in women who have never breastfed or who has done breastfeeding for less than two years. [OR =2.28 (1. 48 -18.8) p = 0.01].[17]

History of ever use of contraceptive as a risk factor for breast diseases did not find any association in our study. Another study by Pakseresht et al in Lok Nayak Hospital, Delhi among 332 women, only 4.5% of the study participants used oral contraceptives and the study did not show any significance of ever use of oral contraceptives and development of breast pathologies.[18]

Pattern of diet influence the development of breast pathologies. In the present study there were 277(74.26%) non vegetarians and 96(25.7%) vegetarians. When checked for association of pattern of diet with breast pathologies and p value was 0.04835, which draws a conclusion that the non vegetarian diet positively influences the development of breast pathologies. In a study conducted in Satara district of Maharashtra had similar findings that of the present study that, non vegetarians have a higher odds of developing breast cancer when compared to vegetarian diet (OR:2.1, CI of 1.4 to 3.7).[10]

The amount of calories in the non vegetarian diet is more compared to vegetarian diet and hence the risk of obesity, which maybe the reason for higher occurrence of breast pathologies in persons following non vegetarianism.

The association between body mass index and breast pathologies was not significant from the present study. A study in Mumbai by TATA Memorial Hospital revealed obesity as a protective factor for breast cancer.[19] In a study conducted in Maulana Azad Medical College in New Delhi revealed that, BMI> 30 has a positive influence in the development of breast cancer with a significant p value of 0.02.[18]

Waist circumference as a risk factor for obesity has also been looked in to by many researchers. 44.2% of study participants had a waist hip ratio of more than 88 cm. When tested for

association for development of breast pathologies the p value was not significant (p value-0.6483). A study from South India evaluating the anthropometric factors for breast cancer revealed a positive association between the same with a significant p value of less than 0.05.[20]

Many researchers suggested waist to hip ratio (WHR) rather than body mass index as a more consistent anthropometric measure influencing the breast pathologies. From the study 3% of the participants had a WHR of more than 0.85 and when tested for association for the development of breast pathologies the p value was significant at 0.02985.



In a hospital based case control study in Mumbai revealed that central obesity as measured by waist to hip ratio increases the chance of occurrence of BC by three fold.[19] A multi centric case control study in South India concluded that WHR has no effect on breast cancer. From both the centres studied, there was no significant difference found and the p value was 0.22 and 0.657 as observed from Chennai and Trivandrum.[20]

It is the distribution of the fat in the body rather than the total body fat which predicts the risk of disease associated with obesity. Waist to hip ratio is a measure of obesity independent of the height and correlates with intra-abdominal fat mass. WHR is a modifiable risk associated with breast pathologies and hence can be a target for prevention.

It is seen from the above discussion that, for most of the established risk factors for breast diseases, statistical significance was not found. This was because the present study was a community based study in general population rather than on subjects already diagnosed with breast diseases. And hence, the number of cases with diseases are less compared to the non diseased.

## CONCLUSION

The present study looked in to the prevalence of breast pathologies and its risk factors. The prevalence of breast pathologies in the community was at par with the findings from other researchers in the region. As far as risk factors for breast pathologies are concerned, the prevalence of dietary factor and the anthropometric factor was significant from the study. The study population was predominantly non vegetarians (74.3%) which positively influenced the occurrence of breast pathologies in the study group with a significant p value of 0.04835.

The prevalence of overweight and obesity in the group was 27%. 44.2% of the population had a waist circumference above 88 cm and 52.8% had a waist to hip ratio of more than 0.85. In anthropometric measurement, waist to hip ratio (p value-0.02985) rather than the body mass index was seen to have an influence on the development of breast pathologies.

The prevalence of reproductive and menstrual risk factors for breast pathologies was low in the study population. The study population had a favourable age at menarche, age at first childbirth, parity status and breastfeeding history. The use of oral contraceptives was also low at 5.6%. Thus it emphasizes the need to tackle the modifiable risk factors to lower the incidence of breast diseases. Educating and empowering the women to understand any deviations from health and to seek help when needed is the only strategy which will help in the long run.

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**Original Research Article**

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Research Article

# Workplace Stress among Doctors of a Medical College in South India

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ABSTRACT

**Background and Objectives:** Mental stress is a major health problem among medical professionals. Healthcare workers suffer from work related or occupational stress often resulting from high expectations coupled with insufficient time, skills and/or social support at work. There is a high incidence of decreased quality of work and life among the medical professionals due to the various stressors in their professional life. Here we have conducted a study among the doctors of Mount Zion Medical College with the following objectives. The objectives of the study were to assess the stress level among various work groups of doctors, explore the relation between work stress and health and compare the stress levels based on age, gender, and designation. **Methods:** The study was a cross sectional study done in Mount Zion Medical College, Adoor, among the doctors from 1/11/2021 to 15/11/2021. All study participants available in the study area satisfying inclusion criteria were taken for the study, which was a sample size of 100, was selected conveniently. A pretested close ended questionnaire was used. Data was entered and coded in Microsoft Excel and analyzed. **Results:** The association of age with the level of stress and stress related symptoms was found to be significant. The association of sex with level of stress and stress related symptoms was found to be insignificant. The association of profession with level of stress was found to be significant while that with stress related symptoms were insignificant. The association of education with level of stress was found to be significant while that with stress related symptoms was insignificant. The association of work experience with level of stress was found to be significant while that with stress related symptoms was insignificant. The association of marital status with the level of stress and stress related symptoms was found to be insignificant. **Conclusion:** Among the study participants who were found to have a significant level of mental stress, it was noted that there was a significant association between age, profession, education, and work experience. Among the study participants who were found to have stress-related health symptoms it was noted that there was a significant association with age only and not with any other factor.

## INTRODUCTION

Stress is a feeling of tension or pressure that people experience when demands placed on them exceed the resources they must meet these demands [1]. There is a considerable debate among stress researchers about how to adequately define stress. According to Selye, Any external event or internal drive which threatens to upset the organism's equilibrium is stress [1]. He has defined stress as the non-specific response of the body to any demand made upon it. Lazarus sees Stress as a result of a transaction between person and environment [3]. Zimbardo defined stress as the pattern of specific and non-specific responses an organism makes to stimulus events that disturbs its equilibrium and exceeds its ability to cope [4]. From the foregoing definitions it may be pointed out that the researchers explained the notion of stress from various perspectives:

I) As an external force which is perceived as threatening;
ii) As response to a situation demanding an individual to adapt to change, physically or psychologically;
iii) As an interactional outcome of the external demand and internal resources;
iv) As personal response to certain variations in the environment;
v) A more comprehensive combination of all.

Occupational stress is related to the workplace. This situation is faced by an employee when there is a total discrepancy between workplace requirements and the person's competency to carry out those requirements in an efficient way. Many organizational factors such as work overload, being underpaid, and an unfriendly working environment can be some of the causes of occupational stress. It is a very complex construct to define. It is related to every person in a different way.

There are many sources of stress as some may be intrinsic related to

profession while some are related to the role of employer and his/her attitude towards the employees of the organization, some to the employees' relationships with each other, some are related to culture and climate of the concerned organization. Some sources of occupational stress are those which come from outside the working environment, worker's personal life etc **(Figure 1).**

Pestonjee has identified 3 important sectors of life in which stress originates: (i) Organizational & Profession sector (ii) Social sector and (iii) Intrapsychic sector [5]. Organizational/ Profession stress has been defined in terms of a misfit between person's skills & abilities and the demands of his/her profession. The concept of Organizational/profession stress falls under the umbrella of a broader concept i.e. Role Stress. Therefore, it becomes imperative to understand the concept of Organizational role, to understand the concept of stress in Organizational & profession sector of life. The focus of the present study is to understand stress in organizational/ profession sector of life.

Every day, physicians encounter stressors that are a fundamental part of medical practice [6]. However, in the past few decades, compared with other professional groups physician's wellness has diminished in every aspect of professional life [7]. Chronic stress may affect the relationship of physicians with their patients and can lead to negative clinical consequences, such as compassion fatigue, unprofessionalism, and clinical errors. Chronic stress can also affect a physician's personal life and result in negative outcomes, such as chronic fatigue, substance abuse, psychiatric morbidity, and suicidal ideation [8].

Doctors provide a vital workforce in health department in India. They have extended working hours and are untiringly providing their services to humanity. Doctors are providing unique services that are not consistent with other social workers. Doctors have long working hours and in addition to providing medical care to patients, they must fight back with ethical dilemmas as well as unjustified demands of management or relatives of patients [9]. Due to all these circumstances, there is increased profession dissatisfaction, high absenteeism, turnover intentions of doctors in hospitals. As far as their personal life and social adjustment is concerned, these aspects of their life are also affected in a negative way due to occupational stress. They may fall an easy prey to addiction, use of alcohol or smoking to relieve stress. Nowadays it is becoming imperative to identify the major causes of occupational stress among doctors and their effects and relationships [10].

In this investigation, we undertook a study involving the physicians at Mount Zion Medical College, aiming to achieve the following objectives: The study sought to evaluate the stress levels within different work groups of doctors, investigate the correlation between work-related stress and health, and compare stress levels across different categories such as age, gender, and professional designation.

## MATERIALS AND METHODS

This was a cross sectional study.

**Sample Size:** 100

**Study Setting:** The study was conducted by an anonymous survey of doctors working in various departments of our hospital over a period of 2 weeks using the validated questionnaire developed by the Indian Council of Medical Research (ICMR).

**Study Duration:** This study was conducted over a period of 2 weeks from 1/11/2021 to 15/11/2021.

**Study Design:** The study is a questionnaire-based analytical study incorporating two questionnaire-based tools. The first questionnaire is used to assess work stress and the second for general health status evaluation. The responses will be analyzed by the Statistical Package for the Social Sciences which will be used for both data analysis and tabular presentation.

**Study Questionnaire:** The study is to be done using two questionnaire- based tools which will be given to 100 participants. The first questionnaire, the work stress questionnaire, has been developed by ICMR, having 32 questions to be scored on 1/2/3/4 criteria, Never 1, Sometimes 2, Frequently 3, and Always 4.

The scores are interpreted as:

- **Scores 32 to 64:** You manage your stress levels very well.
- **Scores 65 to 95:** You have a reasonably safe level of stress
- **Scores 96 to 128:** Your level of stress is too high.

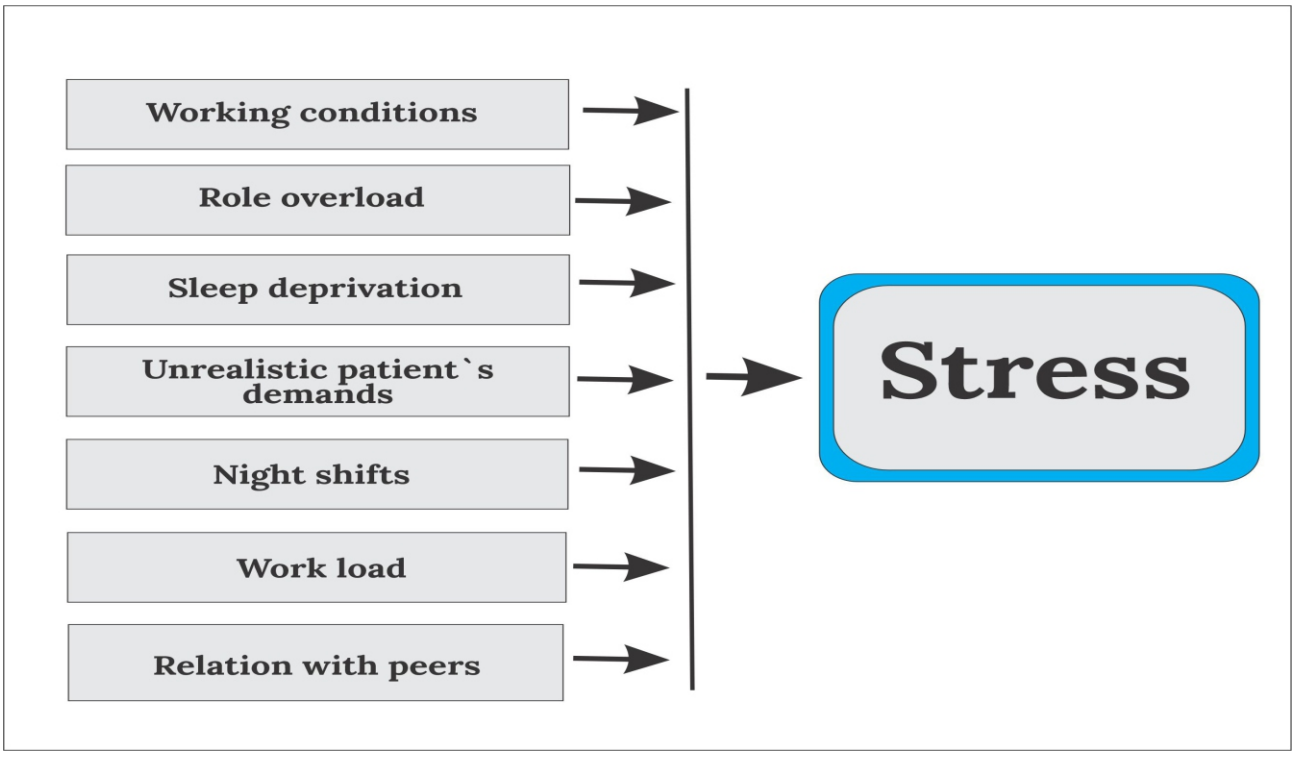


**Figure 1: factors responsible for stress in doctors**

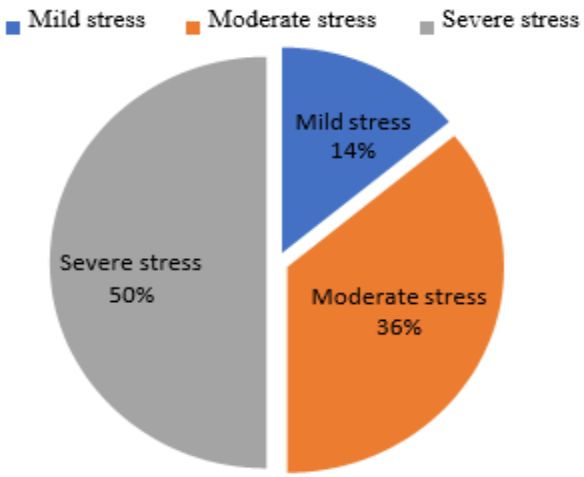


**Figure 2: Distribution of stress levels among study population**

**Table 1: Association between age and level of stress**

| Age | Level of stress | | | | |
|---|---|---|---|---|---|
| | Mild stress | Moderate stress | Severe stress | Total | |
| **20-35** | 2 | 15 | 37 | 54 | |
| **36-50** | 1 | 8 | 8 | 17 | |
| **>50** | 11 | 13 | 5 | 29 | P=0.000 |
| **Total** | 14 | 36 | 50 | 100 | |

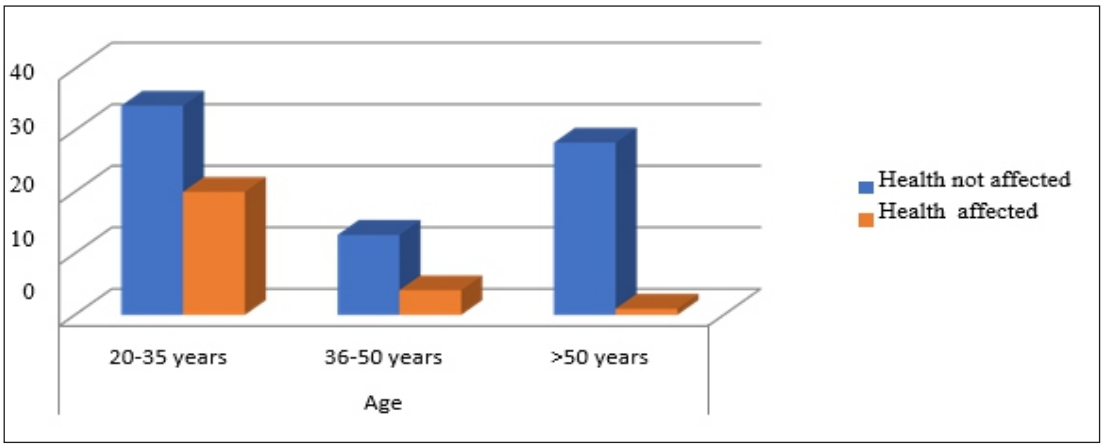


**Figure 3: Distribution of health related symptoms on the basis of age**

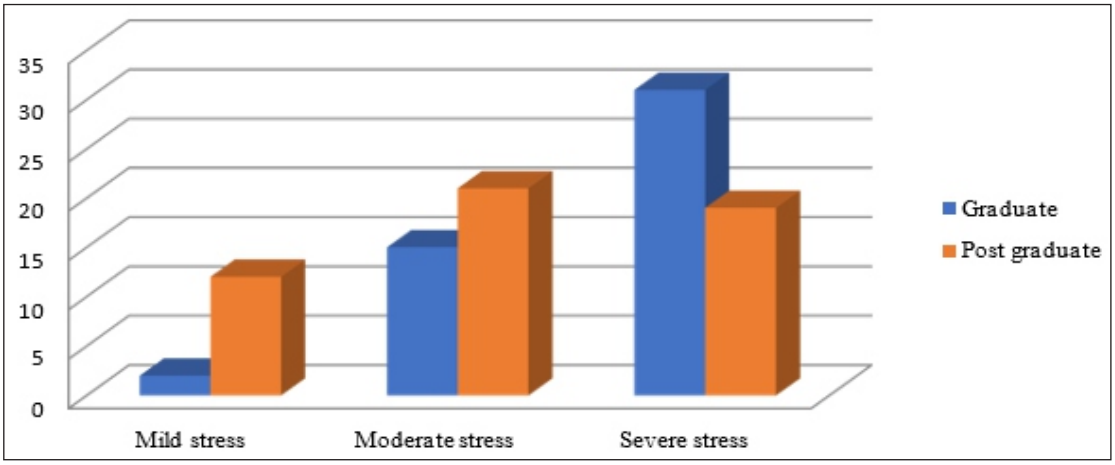


**Figure 3: Association between educations and level of stress**

The second questionnaire which assesses commonly experienced stress symptoms is also developed by ICMR. The questionnaire has 30 questions which are specific to general health. Each question had symptoms needed to be scored 0/1/2 on the criteria Never—0, Sometimes—1, and Always—2.
The scores were interpreted as,

- **Score less than 30** meaning health is not affected,
- **Score more than 30** meaning commonly experienced stress symptoms have effect on individuals' health.

**Inclusion Criteria:**

a) Doctors working in clinical departments.
b) Minimum 3 months of working experience in the institution

**Exclusion Criteria:**

a) Doctors in non-clinical departments
b) Less than 3 months of working experience in the institution

## RESULTS

The study population had 54 male participants and 46 female participants, with 54% of subjects belonging to age group between 20 and 35; 17 were belonging to age group between 36 and 50 and 29 were above age 50. There were 48 graduates and 52 post-graduate doctors. Of the study population 47 are unmarried, 49 are married and 4 are either divorced or widowed. The study population had 50 participants who had more than 1 year of work experience and 50 participants who had less than 1 year of work experience. The study population had 50 participants suffering from severe stress and 36 participants had moderate stress while 14 of the participants only had mild stress **(Figure 2).**

Among the study population, 25 participants had their health affected due to the stress while 75 participants showed only a few stress related symptoms. On analysing the association between age and the level of stress faced in their professional spheres, we could find that in the age group 20-35 years, 2 were having only mild stress, 15 were having moderate stress and 37 were having severe stress, in the age group 36-50 years, only 1 had mild stress, 8 of them had moderate stress and 8 had severe stress and in the age group > 50 years, 14 were having only mild stress, 36 had moderate stress and 50 had severe stress. There is a significant association between age and level of stress .ie, as age advances the level of stress increases. It may be because of the increasing workload with age **(Table 1).**We also could find significant association between age and stress related health problems which means as age advances symptoms of stress also increase proportionally. In the study population belonging to 20-35 years, 34 didn't have much of stress related symptoms while 20 had their health affected, while in the participants belonging to 36-50 years, 13 didn't have much of stress related symptoms while 4 had their health affected, and among the study population >50 years, 28 didn't have much of stress related symptoms while only 1 had their health affected **(Figure 3).**We could not find any significant association between gender and level of stress. Even though many studies have shown positive co-relation between gender and level of stress, the result of this study is not so. Also, we could not find any significant association between gender and stress related health problems. Other studies have shown females are more symptomatic than males. The disparity among the results may be due to the gender distribution changes between the study population and the district.

Out of the 25 participants whose health were affected because of stress, 3 had respiratory symptoms like breathlessness, 3 had CVS symptoms like palpitation, 7 suffered from GIT symptoms like indigestion, 8 had anxiety problems and 4 showed signs of depression like sleeplessness. The depressive symptoms were more among female subjects than males.

There was a significant association between educational qualification and level of stress. Among the 48 graduates in the study population, only 2 had mild stress while 15 had moderate stress and 31 had severe stress, and among the 52 postgraduates in the study population, 12 had mild stress only, 21 had moderate stress and 19 had severe stress **(Figure 3).**

In our study we found that there is no significant association between marital status and level of stress and stress related health problems. But when one investigates the stress and the duration of work experience, we can see that there is a significant association between them. This shows that as work experience increases, the level of stress decreases proportionally as the person understands how to deal with stress through experience.

There was no significant association between work experience and stress related health problems. Various studies have shown that experience increases the level of stress and the stress symptoms reduce significantly. But here significance is not observed since more were new to the profession. While examining the stress symptoms perceived by the subjects, it was found that anxiety and depressive symptoms are more common than symptoms related to other systems.

## DISCUSSION

Many studies have suggested that stress among physicians, nurses and other health care professionals was high in comparison to other types of work, for example, Graham and Rees conducted a comparative study between different occupational groups [9,10]. The most important part of the study is that the health care professionals, compared with non-health care employees have gotten significantly higher levels of pressure within their workplace. Age is a factor that determines stress. Our study had majority of the study subjects between the age group of 20 to 35. Studies done by Hirak Das Gupta *et al*., have shown that majority of their study subjects fell in the age group between 45 and 60 [11]. When one looks into the gender aspect of the study population studies conducted by R Burbeck *et al.,* Chambers and Howie et *al.,* it showed majority of their work force had more males than females. Our study also had more of males, i.e 54% and 46% females [12-14].

Studies conducted by Ronald and Lepnurm and Levey showed in their study that there were more post graduates or doctors with a Masters degree and in our study it was also the same. It can be noted that those physicians, were given important responsibilities compared to the junior staff [15,16]. In the professional aspect, Muthukrishnan analyzed interview data from 103 male and female hospital employees belonging to various categories such as doctors and nurses to find that the level of occupational stress was high. Our study was conducted only among doctors of a private medical college [17].

When studying regarding marital status of the study population, Ramirez *et al.,* and Lee *et al.,* conducted studies in 1996 and 2008 and in their studies the marital status was 38% and 41 % respectively [18,19]. In our study it was found that 49% were married and the remaining was not. Anxiety symptoms are usually more with single subjects due to lack of a partner to share their worries and woes.

When studying about the work experience, Baba investigated the causes of role stress among male and female doctors working in government hospitals [20]. Findings of the study revealed that both male and female doctors experienced organizational role stress. The level of stress experienced by doctors with 11-20 years of experience was the highest, followed by the doctors having experience of 3-10 years which suggested that senior doctors had to shoulder the administrative responsibilities as well, as they grow in their role. In our study we could also find similar findings.

When studying the level of stress and symptoms, the studies conducted by Gold KJ and Shah MA *et al.,* has shown that level of stress as well as stress related health problems are more in health work professionals compared with general population. In our study it was found that 50% suffered from severe stress and 36% from moderate stress [21,22]. Most of the studies had similar findings when comparing stress and stress related health effects.

## CONCLUSION

Within the group of participants experiencing noteworthy mental stress, a notable correlation was observed concerning age, profession, education, and work experience. However, for those participants

exhibiting health symptoms related to stress, a significant association was identified solely with age, with no observable connection to other factors.

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*Research Article*

# A Cross Sectional Study on Sleep Quality among Medical Students and Its Association with Their Academic Performance and Smart Phone Use in a Private Medical College in Kerala

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## ABSTRACT

***Introduction and Objectives:*** Good quality sleep is essential for good health and well-being. However, lifestyle and environmental factors are increasingly causing difficulties in sleeping patterns of individuals. The main effects of sleep deprivation include physical effects like sleepiness, fatigue, hypertension and cognitive impairments like deterioration of performance, attention, motivation, diminishment of concentration and intellectual capacity. Also inadequate sleep increases the likelihood of accidents at work and during driving. Medical education is regarded as one of the most demanding areas of professional education but it is also linked with stress related to studies and postings .It is expected that they are prone to numerous forms of sleep problems. It has also been found that using mobile phones highly linked to sleep-related difficulties in medical students .Due to the demanding nature of medical school and the possible consequences of poor sleep on outcomes in academics, clinical care and mental health, sleep quality is a crucial concern for medical students. This study aims to assess the sleep quality among medical students using PSQI (Pittsburgh Sleep Quality Index) Score and to identify the factors associated with sleep quality. ***Materials and Methods:*** The study was a cross sectional study conducted from October 20$^{th}$ to November 20$^{th}$ 2023 among 180 randomly selected medical students of 2019, 2020 and 2021 batches of Mount Zion Medical College. Sleep quality and factors affecting their sleep was assessed using PSQI (Pittsburg Sleep Quality Index) Score and SAS-SV (Smart phone Addiction Scale-Short Version) questionnaire. Academic performance of each student was assessed based on the percentage of their last university examination. ***Results:*** 77.8% of the study population had normal sleep quality whereas 22.2% had sleep disturbances according to PSQI score. A score more than 5 according to PSQI score was taken as considerable sleep disturbance. PSQI global score range between 0 to 21.Higher the PSQI score worse the sleep quality.83.3% of students showed smart phone addiction whereas 16.7 % of study participants had no considerable smart phone addiction according to SAS-SV score. A score more than 15 was considered as problematic smart phone use or addiction to smart phone use. SAS-SV score ranges between 0 and 60.The study showed significant association for sleep quality with academic performance and smart phone addiction. ***Conclusion:*** Sleep Quality issues in terms of sleep duration, day time dysfunction and sleep disturbances were common among medical students. Students who performed well in their academics had good sleep quality pattern. Among those with no considerable smart phone addiction majority had good sleep quality. Thus good sleep quality was found to be associated with better academic performance and balanced smart phone use.

## Introduction

The significance of good quality sleep in maintaining optimal health and well-being cannot be overstated. Sleep is a crucial physiological activity that allows the human body to function properly [1]. Various indicators are used to assess sleep disturbances and disorders, providing insights into the overall sleep health of an individual. Sleep latency, the time it takes to transition from wakefulness to sleep, is a key indicator of sleep efficiency [2]. Prolonged sleep latency can be influenced by factors such as stress and environmental conditions, and it is associated with a higher risk of sleep disorders. Monitoring the number and duration of nocturnal awakenings provides further information on sleep quality. Frequent awakenings may signal disturbances such as insomnia or sleep apnea, impacting the overall restorative nature of sleep **(Figure 1)** [3].

Total sleep time is essential for maintaining health, with chronic sleep deprivation linked to various physical and cognitive impairments. Proper rhythms of specific sleep stages, including Rapid Eye Movement (REM) sleep, play a vital role in emotional regulation, memory consolidation, and cognitive health [4]. Disruptions in these sleep stages can contribute to mood disorders and impact overall mental well-being. Autonomic functions, such as heart rate, blood pressure, vasoconstriction, and respiratory rate, undergo significant changes during different sleep stages[5].These fluctuations are integral to cardiovascular health and overall homeostasis. Disturbances inautonomic functions during sleep can contribute to sleep disorders


**Figure 1: Different factors affecting sleep**

and exacerbate existing health conditions[6].

Repetitive nights of sleep disruption over a week or a month can lead to cumulative sleep debt, impacting physical health, cognitive performance, and emotional well-being [7]. The long-term consequences of persistent sleep disturbances emphasize the importance of early intervention and effective sleep management strategies. Self-reported sleep, while considered the least reliable objectively, holds subjective importance for individuals[8]. Perception of sleep quality and satisfaction influences overall well-being and daily functioning. Understanding both objective and subjective indicators is crucial for a comprehensive evaluation of an individual's sleep health[9-11].

The effects of sleep deprivation extend beyond mere fatigue. Physically, it manifests as sleepiness, fatigue, and hypertension. Cognitively, inadequate rest leads to deterioration in performance, attention, motivation, mental concentration, and intellectual capacity. The increased likelihood of accidents at work and during driving is a significant concern, highlighting the impact of sleep deprivation on safety[12, 13]. Mental health complications are also associated with insufficient sleep. Inadequate rest impairs the ability to think, handle stress, maintain a healthy immune system, and regulate emotions. The potential consequences include falling asleep at work, school, or while driving, feelings of tiredness, concentration and vigilance detriments, memory blanks, irritability, frustration, and a higher probability of accidents or injuries[14, 15].

The World Health Organization (WHO) has recognized the det-rimental effects of insufficient sleep on various aspects of health. Insufficient sleep is linked to cardiovascular diseases, neurocognitive function, psychological disorders, metabolic abnormalities, immunological response, and academic performance. This acknowledgment underscores the need for prioritizing sleep as a crucial component of overall well-being[16].

The journey to becoming a medical professional is undoubtedly rigorous and demanding, marked by high academic and professional standards[17]. Admission to medical school is highly competitive and requires exceptional achievement. However, the demanding nature of medical education often takes a toll on the sleep quality of medical students, making sleep disruption a prevalent concern within this population. Medical students, due to the intense academic and clinical demands, are particularly prone to various forms of sleep problems [18]. Research indicates that sleep disruption among medical students is not merely an isolated issue but is, in fact, akin to a pandemic when compared to the general population. The unique challenges faced by medical students contribute to a heightened susceptibility to sleep-related difficulties[19-21].

The use of electronic devices, such as mobile phones and television, has been identified as a significant contributor to sleep problems among medical students. The prevalent use of these devices, often as a means of unwinding or staying connected, can interfere with the natural sleep-wake cycle. The exposure to the blue light emitted by screens can disrupt the production of melatonin, a hormone responsible for regulating sleep, leading to difficulties in falling asleep and maintaining a restful sleep. The demanding nature of medical school, characterized by high academic expectations, long study hours, and intensive clinical rotations, creates a perfect storm for sleep distur-

-bances and disorders. The pressure to excel academically, coupled with the responsibility of patient care in clinical settings, can contribute to heightened stress levels and increased anxiety, further exacerbating sleep-related challenges [22-24].

The consequences of poor sleep quality among medical students extend beyond personal well-being and comfort. The potential impact on academic performance is a significant concern, as inadequate sleep has been linked to decreased cognitive function, impaired memory consolidation, and reduced overall academic achievement. In the field of healthcare, where critical decision-making is paramount, compromised cognitive function due to poor sleep can have far-reaching consequences for patient care [25].

Mental health is also a critical aspect affected by sleep quality in medical students. The stressors inherent in medical education, combined with sleep-related difficulties, can contribute to elevated levels of stress, anxiety, and depression. Mental health concerns not only affect the individual's well-being but can also impact their ability to provide compassionate and effective care to patients [26].

Recognizing the importance of addressing sleep-related challenges among medical students, educational institutions and healthcare systems are increasingly implementing strategies to promote better sleep hygiene. These strategies may include educational programs on the importance of sleep, counseling services to address stress and mental health concerns, and interventions to reduce the use of electronic devices before bedtime [27].

The demanding nature of medical education and the associated pressures make medical students particularly susceptible to sleep-related difficulties. Acknowledging the prevalence of sleep disruption in this population is crucial for developing targeted interventions and support systems. Improving sleep quality among medical students not only enhances their personal well-being but also contributes to better academic outcomes, improved clinical performance, and overall mental health. As the medical community continues to prioritize the holistic well-being of its future professionals, addressing sleep-related challenges becomes an integral aspect of fostering a healthier and more resilient generation of healthcare practitioners [28-30].

This study aims to assess the sleep quality among medical students in a private medical college in Kerala using PSQI (Pittsburgh Sleep Quality Index) Score. The study also aims to identify any association of factors like academic performance and smart phone use with sleep quality.

## Materials and Methods

**Study design**: Institution based Cross sectional study

**Study setting**: Mount Zion Medical College, Adoor

**Study duration**: 1 month (20/10/23 -20/11/23)

**Type of sampling**: Stratified sampling

**Sample size:** After considering 5 % of non-response rate sample size calculated as 180

**Study tools**: Data was collected using predesigned and pretested questionnaires. It included Pittsburgh Sleep Quality Index (PSQI) Smartphone Addiction Scale- Short Version (SAS-SV) along with general information questionnaire for general details and academic score.

**Study methodology**: Students from 2019, 2020 and 2021 batches who had appeared for their last university exam were included in the study. A sample size of 180 students were calculated and by probability proportionate sampling method ,from a total of 94, 77 and 120 students of 2019, 2020 and 2021 batches 58, 48 and 74 students were selected respectively from each batch randomly using random number generator available online. Collection of data was done using a semi structured questionnaire including the PSQI questionnaire and SAS-SV questionnaire along with general information related questions given to participants as Google forms Data was entered into Microsoft excel and analyzed using SPSS version 20. Descriptive statistics were used to express variables like sleep quality, its components and smart phone addiction. Chi-square test was applied to test association of qualitative variables.

## Results

The mean age of the study population was 22.18+/-1.24 years.Among the 180 participants, 63.7% were females and 36.3% males. Out of the 180 study population, 32.2% belonged to 2019 batch , 26.7 % to 2020 batch and 41.1 % belonged to 2021 batch .Among 180 study participants,1.1% were day scholars and 98.9% of them were hostlers.

Out of the 180 students, 14.4% of students had more than 7 hours of sleep duration, 62.8% had 6 to7 hours of sleep duration, 19.4% had 5-6 hours of sleep duration and 3.3% of students had less than 5 hours of sleep duration 87.8% of students had sleep efficiency more than 85% of and 12.2% of students had sleep efficiency less than 84%. 36.1% of the study population had sleep latency score zero, 42.2% had sleep latency score 1-2 ,19.4% had score 3-4 and 2.2 % showed sleep latency score 5-6.Hence 2.2 % had poor sleep latency score because higher scores indicates poor character of sleep. 36.1% of the study population showed no daytime dysfunction whereas 10% showed severe day time dysfunction.

Subjective sleep quality was found good in 23.3% of the study population, 66.1% had fairly good subjective sleep quality, 9.4% had fairly bad subjective sleep quality and 1.1% had very bad subjective sleep quality score. Almost 10.5% of the study population had a bad sleep quality. Out of 180 study population 21.1% showed no sleep disturbances, 72.2% showed mild sleep disturbances, 6.7% showed moderate sleep disturbances and no one showed severe sleep disturbances. Thus 78.9% showed mild to moderate sleep disturbance.

94.4 % were not using any sleep medications for past one month , 3.3% were using sleep medications for less than once a week ,1.1% were using sleep medications once or twice a week and 1.2% were using sleep medications for three or more times a week. Hence 5.6% of the study population ever used sleep medications over past one month.

As per PSQI score,77.8% had normal sleep quality and 22.2% had po-

-or sleep quality A PSQI score of more than 5 was considered as poor sleep quality **(Figure 2).** Higher the PSQI score worse t-

-he sleep quality. Mean value of PSQI score was 5.02+/-2.61.

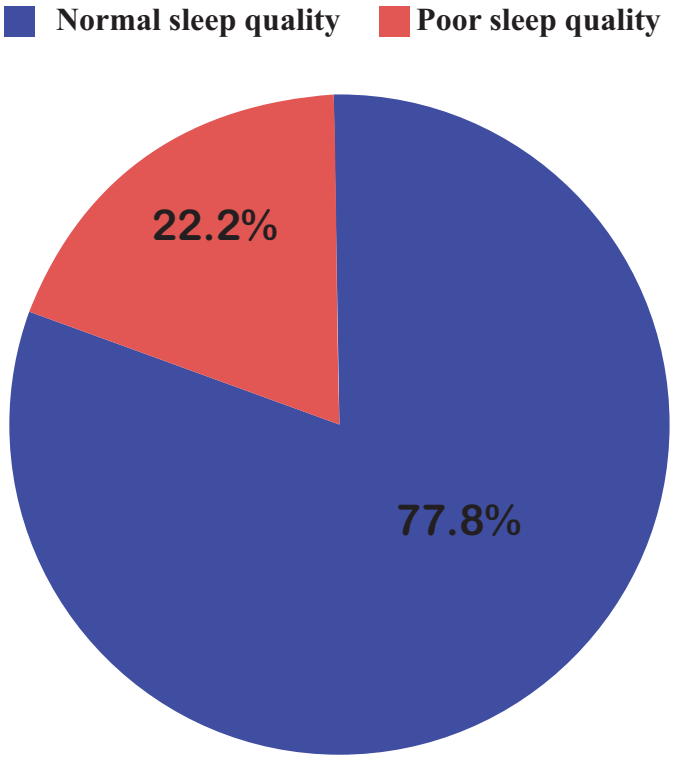


**Figure 2: Distribution of study population based on sleep quality**

Out of 180 students,83.3% of students had considerable smart phone addiction and 16.7% did not have smart phone addiction as per SAV-SV score. SAS-SV score more than 15

was taken as considerable smart phone addiction.

Higher the scores the greater the problematic use of smart phone **(Figure 3).**

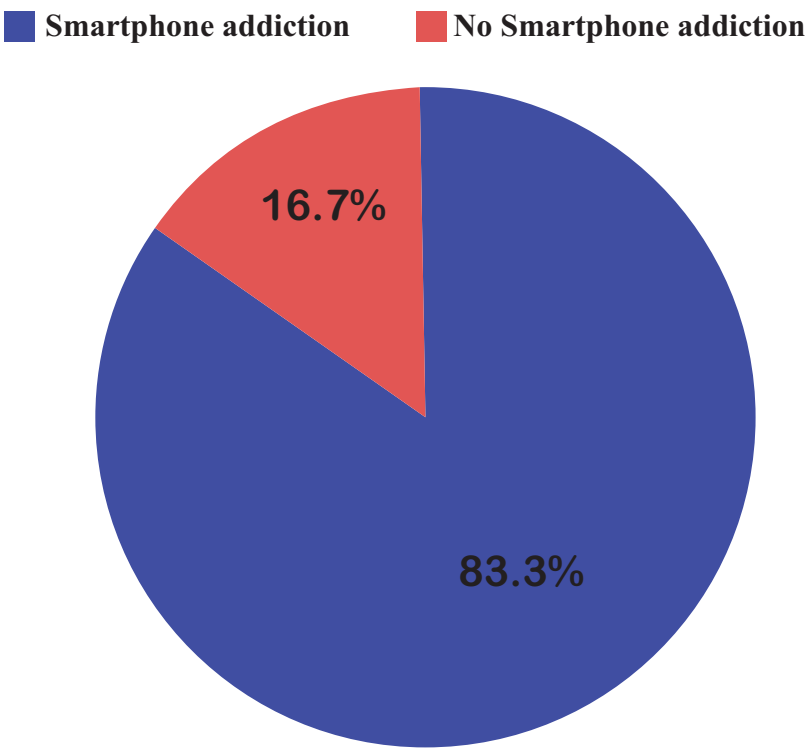


**Figure 3: Distribution of study population based on smart phone addiction**

**Table 1: Results showing the association of sleep quality with academic performance of study participants**

| Academic performance | PSQI Score based Sleep Quality | | Total |
|---|---|---|---|
| | Good Sleep Quality | Poor Sleep Quality | |
| Good | 134 (80.2%) | 33 (19.8%) | 167(100%) |
| Poor | 6 (46.2%) | 7 (53.8%) | 13(100%) |
| Total | 140 | 40 | 180 |

Chi Square value 8.108 p value <0.01

Among the students who performed poor in their academics, 53.8% showed sleep disturbances whereas 46.2% did not have any sleep quality issues. On the other hand, out of students who performed well in their academic performance 80.2% had good sleep quality and only 19.8% had poor sleep quality. This association between sleep quality and academic performance was found to be significant with a p value less than 0.01**(Table 1).**

Among those with no considerable smart phone addiction 83% had good sleep quality and only 17% had poor sleep quality. Out of those study participants with smart phone addiction 37.8% had poor sleep quality whereas among those with no smart phone addiction only 17% had poor sleep quality. This finding was found significant with a p value less than 0.01**(Table 2).** No significant association was found between sleep quality and place of residence/stay and choice of study.

**Discussion**

According to a cross sectional study by Muralidhar M *et al.,* on sleep quality among medical students conducted at a Medical College, Wayanad District, Kerala in 2018 62.4% had good sleep quality and 37.6% had poor sleep quality. The prevalence of poor sleep quality was more among those who had failed in the previous university exam/internal assessment when compared to those who had secured distinction/I/II class. This finding was similar to the finding from our current study where 77.8% had normal sleep quality and poor sleep quality was associated with poor academic performance [31-33].

**Table 2: Table showing the association of sleep quality and smart phone use among study participants**

| Smart Phone Use | PSQI Score based Sleep Quality | | Total |
|---|---|---|---|
| | Good Sleep Quality | Poor Sleep Quality | |
| No Smart phone addiction | 112 (83%) | 23 (17%) | 135 (100%) |
| Smart phone addiction | 28 (62.2%) | 17 (37.8%) | 45 (100%) |
| Total | 140 | 40 | 180 |

Chi square value 8.400 p value <0.01

In a cross-sectional study conducted by Anuradha R *et al.,* among 367 undergraduate medical students in Government Medical College, Chennai, Tamil Nadu, in 2017, Pittsburgh Sleep Quality Index (PSQI) was used to asses sleep quality. Poor quality of sleep was found among 54.2% of students. Poor sleep quality was significantly associated with increased duration of mobile phone usage. Significant association was found between sleep quality and academic performance .Statistically significant correlation was found between sleep quality and duration of mobile phone usage. Mobile phone overuse was significantly associated with poor sleep quality and excessive daytime sleepiness. Students with good quality of sleep had better academic performance when compared to poor slee-

-pers. This finding was comparable to our study finding that showed strong association between sleep quality, academic performance and smart phone use [35,36].

In another cross-sectional study conducted Kurugodiyavar *et al.,* among 240 medical students at KIMS, Hubballi, Karnataka it was found that 48.75% were poor sleepers 51.25% were good sleepers according to PSQI global sleep score. According to SAS score 51.2% were low users and 48.75% were high users of smart phone. The mean PSQI global score(SD) was 4.8 (2.49). This study concluded that in medical students smart phone addiction affects sleep quality significantly[27, 37, 38].

In a cross-sectional study by Awasthi S *et al.,* conducted among the undergraduate medical students of Government Medical College (GMC), Haldwani, Uttarkand smart phone addiction scale (SAS-SV) and WHO-BREF questionnaires for QOL were used for assessing smart phone use and QOL of the medical students, respectively. Out of the total 395 medical students, 42% considered themselves addicted to the smartphone. According to SAS-SV, smart phone addiction was found among 43.8% medical students. The QOL of the students was significantly affected by smart phone use in all domains assessed. Study concluded that smart phone addiction was high among medical students and it had a significant negative impact on their QOL. This study also share similar finding as our current study in relation with smart phone use among medical students. An observational study conducted Sinha S and Patil M in 2018 among medical students of Belagavi, Karnataka concluded that even though mobile phone has positive role in daily lives, its overuse had lead to negative impact on health, sleep, and academic performance of students[39,40].

In a study conducted by Sonali Sharma *et al.,* in RUHS College of Medical Sciences, Jaipur, on sleep quality among medical students and its relation with academic performance majority of students had a global PSQI score greater than 6 and about 67% of students were poor sleepers. They concluded that early screening for poor sleep quality among medical students was essential in assessing the magnitude of the problem and early interventions are needed to improve their academic performance and quality of care provided by them later in their professional life [41].

## Conclusions

Sleep Quality issues in terms of sleep duration, day time dysfunction and sleep disturbances were common among medical students. Students who performed well in their academics had good sleep quality pattern. Thus good sleep quality was found to be associated with better academic performance. Among those without considerable smart phone addiction, majority had good sleep quality.

## Conflict of Interest

The authors declare that there is no conflict of interests regarding the publication of this paper.

## Source of Funding

None to declare

## Ethical Clearance

Necessary approval has been taken from institutional ethical committee.

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Original Research Article

# A cross sectional study to assess the determinants of early menarche in school going population in catchment area of UHTC of tertiary health care facility in Raigad district

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## Abstract

**Objectives:** To study the mean age at menarche and factors influencing onset of menarche. **Materials and Methodology:** A Cross-sectional study among female students between 10 to 16 years of age of a Higher Secondary School in catchment area of UHTC. Pre-designed and tested questionnaire was used for data collection. Anthropometric measures recorded and BMI calculated. **Results:** Out of total sample size of 197, 129(65%) had got the menses. Mean age of menarche was found as 12.4years. Smart phone use also resulted in early menarche among the study population. **Conclusion:** Apart from genetics, other factors like socioeconomic, nutritional habits, exercise, use of smart phones also influence menarche. Health educational session at schools should stress on modifiable factors for better health implications.

**Key Words:** Menarche, Factors affecting menarche, Socioeconomic status.

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## INTRODUCTION

Menarche is one of the most important event in a women's life. Menarche is a rather late event in puberty and heralds the transformation from childhood to adolescence. The age that menarche occurs varies and is dependent on the interaction between genetic and environmental factors. However, enormous spatial variations in age at menarche were documented both between and within sub-national human populations. Owing to commendable improvements in the field nutritional supply, public health interventions and socioeconomic advancement, the menarcheal age exhibited a secular declining trend across human population of late with considerable variability[1]. The mean age at menarche reportedly varied from 16.50 years to 12.43 years across various subgroups of Indian women over the past four decades. Notably, most of the studies that reported age at menarche above 13 years were estimates during 1970–1990, while remaining studies that provided estimates of age at menarche below 13 years were recent studies mostly after 2000[2,3,4]. Factors which have an impact on the menarche are heredity, racial or ethnic differences, geographical differences, body mass index, body fat, nutrition, physical activity, socioeconomic status, parental education, stressful family environment and acute or chronic illnesses[5]. So this study

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is intends to find the average age at menarche in the population under study and various factors which will have influence on the menarche by assessing various parameters like socioeconomic factors, nutritional factors, mass media influences and smartphone usage.

## MATERIALS AND METHODOLOGY

This was a cross sectional study carried out on female students of a secondary school in a urban area of Raigad District. All girl children between 10 to 16 years who are willing to participate for the study were included in the sample size. School was selected by random sampling method out of 5 schools which was semi-government schools. The study was conducted in 2018 for a period of three months. A pre-designed and tested questionnaire was used for data collection which was prepared in local language. Questionnaire was given to students and they were not allowed to discuss among themselves. Anthropometric measures were recorded with the help of teachers and BMI calculated later. Data entry and analysis was done using Microsoft Excel. Chi square test and p value were calculated for each pararmeters with respect to the menarchal categories. Institute Ethics Committee Clearance was obtained before start of study. Parental consent, verbal consent from the students and consent from the Principal of the School were also obtained.

## RESULTS

Out of a sample size of 197 subjects,129(65%) were found to have attained menarche. 83.76% of students were aware about the menstruation at the time of study and most of them(60.6 %) were about the same through their mothers. Average age at menarche was found to be 12.4 years from the study where as average age at menarche of mother's were14 years. Early menarche (10-11years) was seen in 23.3% of subjects and late menarche (14-15) in 16.3%. Average age at menarche was lower in girls who are over-weight (11.7years) and higher in those who are under-weight (12.56) but p-value was not significant(p0.6).Another significant finding was that the onset of menarche was seen early in girls who used smart phones for more than 30 minutes (p 0.007).

**Table 1:** Comparison of menarche with different factors

| Parameter | frequency | Percentage | Average age at menarche | P value |
|---|---|---|---|---|
| **Religion** | | | | |
| Buddhist | 11 | 5.58% | 12.18 | |
| Christians | 4 | 2.03% | 12.5 | 0.4 |
| Hindus | 171 | 86.80% | 12.4 | |
| Muslims | 11 | 5.58% | 12.1 | |
| **Socioeconomic Class (kuppuswamy's)** | | | | |
| Upper | 21 | 10.66% | 12.6 | |
| Upper Middle | 104 | 52.79% | 12.2 | 0.06 |
| Lower Middle | 62 | 31.47% | 12.78 | |
| Upper Lower | 10 | 5.08% | 12.29 | |
| **Dietary pattern** | | | | |
| Vegetarian | 38 | 19.3% | 12.7 | |
| Non-Vegetarian | 159 | 80.7% | 12.3 | 0.1 |
| **BMI** | | | | |
| < 18.5 | 109 | 55.33% | 12.56 | |
| 18.5 to 24.9 | 74 | 37.56% | 12.33 | 0.6 |
| > 25 | 14 | 7.11% | 11.7 | |
| **Exercise** | | | | |
| No exercise | 62 | 48.1% | | |
| Less than 30 minutes | 36 | 27.9% | | 0.8 |
| More than 30 minutes | 31 | 24.0% | | |

**Table 2:**

| Smart Phone usage | Early menarche | Ideal Age | Late menarche | Grand Total | P value |
|---|---|---|---|---|---|
| Not using phone | 10 | 24 | 4 | 38 | |
| Less than 30 minutes | 4 | 29 | 13 | 46 | |
| More than 30 minutes | 16 | 25 | 4 | 45 | |
| **Grand total** | **30** | **78** | **21** | **129** | 0.007 |

## DISCUSSION

This study found that the average age at menarche was 12.4 years in an urban area in Raigad district of Maharashtra which is less compared to a study by Dambhare *et al* (2011) conducted in Wardha district which was 13.5 years[6.]. Another study by Khadgawat R *et al* (2016) in Delhi found the average age at menarche to be 12.4 years[7]. Study shows that 23.3% attained early menarche and 16.3 % were under late menarcheal age group. The early onset of menarche was recorded in 18% and late onset in 13.6% of the girls in a study conducted by Bagga A *et al* (2000) in Pune, Maharashtra[8]. In another study conducted at Aligarh 25.8% were found as early matures and 15.5% girls as late matures[9]. Average age at menarche was lower in girls who are over-weight (11.7years) and higher in those who are under-weight (12.56) but p-value was not significant. Awadhi N A *et al* (2013) in Kuwait showed that median age at menarche in overweight girls as 12.00 years, in obese as 12.19 years, those with normal BMI as12.61 years and underweight as13years[10]. Ahmed S M *et al* (2016) in a study conducted in Karachi observed no significant difference with BMI[11]. Some other studies also showed no assosciation with BMI and menarcheal age[12,13,14]. Quality of food is also said to influence the menarche. Studies have been conducted to find any association between intake of animal protein versus vegetable protein and also of carbonated drinks[15-19].Present study compared vegetarianism and non-vegetarianism and found no association with the same. Socioeconomic status studied did not show any difference. Studies conducted in Karachi by Ahmed S M *et al* and another study in Turkey also showed varied results[11]. Strenous physical activity is another factor which influences menarche. In our study most of the subjects who attained menses had no physical activity or did it for less than 30 minutes however pvalue is non-significant.Dambhare D G *et al* in a cross-sectional study conducted in adolescent age group concluded that mean age of menarche is lower in children of higher socio-economic class and higher in those involved in vigorous sports activity[6.] Watching movies or reading a book of any particular type was not found significant. However,early menarche was seen in girls who uses smartphones for more than 30 minutes. A study by Brown JD *et al* in 2005 concluded mass media as a sexual super peer for early maturing girls[20].

## CONCLUSION

Age at menarche has definitely fallen from what it was a decade ago. Apart from those factors which are conventionally studied there are many more which influences menarche. It was difficult to draw a casual inference since this was a cross-sectional study and because of limited sample size. We collected data close to the time of menarche so as to reduce the recall bias. Menarcheal age has important health implications as early menarche is associated with more cardiovascular risk, cancer risk, anxiety, depression and sexually transmitted diseases. So more multicentric studies are needed to find the cause for change in trends of menarchal age including the role of mass media and smartphone usage and of any possible interventions

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