Original Research Article

Knowledge and attitude regarding organ donation and transplantation among medical students of a medical college in South India

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ABSTRACT

Background: The shortage of organ donors is the key rate-limiting factor for organ transplantation in India. Many strategies have been proposed. One of the strategy is by improving awareness of organ donation and transplantation in the population. This study seeks to assess the knowledge and attitude of the medical students toward organ donation and transplantation. The objective of the study was to assess the knowledge and attitude regarding organ donation and transplantation among medical students.

Methods: A cross-sectional study was conducted among 510 undergraduate medical students of K.S Hegde Medical Academy. A tool with 30 questions was designed and administered to the students, in order to assess their knowledge and attitude regarding organ donation and transplantation. Data collected was analysed using SPSS software.

Results: The mean age of the students was (20.21±1.32). When compared to boys, girls reported higher mean scores in knowledge (9.22±1.11); and attitude (7.32±0.81). The first year students had higher scores for their knowledge (9.46±1.28) compared to other years. The third year students showed a higher mean attitude score (1.61±1.07) (p=0.02). Hindus scored significantly higher mean knowledge, and attitude as compared to Christians and Muslims (p=0.03). There was a positive correlation between mean knowledge, and attitude of students regarding organ donation and transplantation.

Conclusions: There was adequate knowledge in students but their attitude was poor. The study throws light on their inadequacies of knowledge and attitude of medical students, necessitating the inclusion of the topic in their curriculum.

Keywords: Organ donation, Organ transplantation, Medical students, Knowledge, Awareness

INTRODUCTION

Knowledge and beliefs regarding organ donation and transplantation are some of the most important factors influencing individual donation preferences.[1] Of a total of 9.5 million deaths annually in India, nearly 100,000 are due to organ failure. To save and extend lives, organ donation and organ transplantation have become the only hope.[2] Organ transplantation is the transfer (engraftment) of human cells, tissues or organs from a donor to a recipient with the aim of restoring function(s) in the body.[3] It can be related to a deceased donor or a living donor.

Organ transplantation is often the only treatment for end state organ failure, such as liver and heart. Although end stage renal disease patients can be treated through other renal replacement therapies, kidney transplantation is generally accepted as the best treatment both for quality of life and cost effectiveness. Kidney transplantation is

by far the most frequently carried out transplantation globally.[4]

Frankenstein's monster was put together from body parts of the dead and infused with life by electricity from lightening in the sky. Though Frankenstein is a fantasy story by Mary Shelley, the use of body parts of others has become possible in the contemporary age. The idea of transplanting animal or human parts dates back many centuries, though the first successful transplant of human-to-human tissue (cornea) was achieved on 7th December 1905.[5] Organ donation and transplantation got legalized in India, under the "Transplantation of Organ Act, 1994".

Students have a huge responsibility in the community. Organ donation number can be increased by improving their knowledge and developing more positive attitudes toward organ donation and transplantation. Medical students have different opinions which are governed by socio cultural factors such as traditional customs, the practice of preservation of intact body after death, uneasiness in discussing death related issues and family objections. As future doctors, medical students have to take up the role of promoting organ donations which is the need of the day.

While a majority of healthcare professionals support organ donations, only a small proportion donors.[6] Knowledge and attitude of health care providers towards organ donation plays a major role in promoting the concept among population.[7] The general population and the student population in particular, need to be educated about transplantation and the need to accept the commitment to donate organs. Therefore, the present study was designed to assess and compare the knowledge, attitude and practice regarding organ donation and transplantation, among medical students, based on gender, year of the course and religion.

METHODS

A cross-sectional questionnaire-based study was conducted between May 2016 and August 2016 to assess the knowledge and positive attitude regarding organ donation and transplantation among undergraduate medical students of a medical college in South India. After receiving approval from the institution's ethical committee, the cross-sectional study was carried out among the medical students of the institution. With each academic year having an average of 100 students, the total number of students came to around 510 students. Convenient sampling method was used to obtain a total sample size of 510. All the students who were present on the day when the questionnaire was given were included in the study. Those who were not willing to participate or not giving the consent were excluded. Anonymity and confidentiality of respondents were maintained and participation was voluntary.

A self-administered questionnaire containing 30 questions was developed comprising of three parts. The first part of the questionnaire gathered the demographic details from the students, which included age, gender, religion and year of study. The second and third parts assessed the levels of knowledge and attitude regarding organ donation, respectively. The responses were recorded on a dichotomous scale (Yes/No). For each "Yes" response, it was scored '1' and for each "No" response '0' was given. Reverse scoring was done where the correct responses were "No." The total scores obtained were summed up. The higher scores indicated good knowledge and positive attitude regarding organ donation.

The questionnaire was distributed to undergraduate medical students during college hours in the classroom after taking informed consent. The participants were instructed not to discuss the questions/answers among themselves. Only completed questionnaires were utilized for the study.

Statistical analysis

The data obtained were entered into excel sheet and analysed using SPSS version 22. Descriptive data were analysed using frequency, percentage and proportion. Chi-square and One-way ANOVA were used for comparing means of normally distributed continuous variables.

RESULTS

Out of a study population of 510 participants, 180 (35%) were boys and 330 (65%) were girls, with a mean age of 20.2±1.32 years.
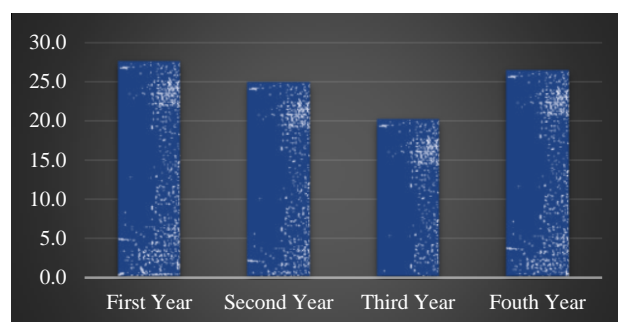
Figure 1: Year wise distribution of the study population, first year medical students (27.8%), followed by final year medical students (26.7%), second year medical students (25.1%) and third year medical students (20.4%).

Majority of the study population were first year medical students (n=142, 27.8%), followed by final year medical students (n=136, 26.7%), second year medical students (n=128, 25.1%) and third year medical students (n=104, 20.4%) (Figure 1).

Table 1: Assessment of knowledge regarding organ donation among medical students.

Assessment of knowledge	P value		
	Gender	Year of study	Religion
Organ donation	0.612	0.001	0.005
Transplantation of human organs act	0.030	0.001	0.500
Place of issue of organ donation cards	0.430	0.001	0.000
Cadaveric organ donation	0.090	0.020	0.001
Brain dead organ donor being disconnected from ventilator	0.010	0.640	0.820
Human leucocyte antigen (HLA)	0.055	0.001	0.490
Hepatitis B and c carriers being organ donors	0.110	0.001	0.050
Malignancy being a contraindication to organ donation	0.510	0.050	0.001
Premature termination of treatment for registered organ donors	0.650	0.820	0.250

*Chi-square test.

Table 2: Assessment of attitude regarding organ donation among medical students.

Assessment of attitude	P value		
	Gender	Year of Study	Religion
Being comfortable to think or talk about organ donation	0.720	0.140	0.130
Willingness to be an organ donor	0.049	0.050	0.140
Belief on donation of body if body parts are not kept intact after death	0.025	0.060	0.050
Fear of donation that one's body will be disfigured after organ donation	0.00	0.950	0.060
Feeling that one's family will donate their organs	0.120	0.280	0.950
Willingness to motivate family to donate organs	0.010	0.020	0.280

*Chi-square test.

Table 3: Comparison of levels of knowledge and attitude of medical students.

|	Knowledge				Attitude			
Variables	Poor n (%)	Average n (%)	Good n (%)	P value	Low n (%)	Average n (%)	High n (%)	P value
Gender								
Males	31 (17.2)	117 (65)	32 (17.7)	0.33	168 (93)	12 (6)	0	0.24
Females	34 (11)	217 (65)	79 (24)		327 (99)	3 (1)	0	
Year of study								
First year	18 (12.5)	95 (67)	29 (20.5)	0.08	140 (99)	2 (1)	0	0.81
Second year	5 (4)	78 (61)	45 (35)		123 (96)	5 (4)	0	
Third year	17 (16)	70 (68)	17 (16)		101 (99)	3 (1)	0	
Fourth year	16 (11)	90 (66)	30 (23)		136 (100)	0	0	
Religion								
Hindus	43 (13)	220 (68)	61 (19)	0.03*	324 (100)	0	0	0.04*
Christians	12 (11)	64 (59)	33 (30)		109 (100)	0	0	
Muslims	2 (2)	44 (58)	31 (40)		63 (81)	14 (19)	0	

*One-way ANOVA test.

As per their religion, majority were Hindus (64%), followed by Christians (21%), and Muslims (15%) (Figure 2).

On comparison of correct knowledge among students, the girls had a better knowledge as compared to boys, however a significant difference was noted for questions related to awareness of transplantation act, organ donation in a brain-dead person and HLA antigen, where the boys had better knowledge than the girls (p<0.05). Even though majority of the first year students had correctly responded to the questions assessing knowledge on organ donation and transplantation when compared to the other year students, low knowledge was observed for questions related to knowledge of organ donation cards and cadaveric organ donation between them and others, where first year's fared poorly and it was statistically significant (p<0.05). Regarding donor's and recipient's

blood matching, it was seen that fourth year students had significantly higher knowledge as compared to other students (p<0.05). Knowledge on donor's and recipient's HLA matching was better in third year students as compared to others (p<0.05). Amongst the religions, Hindus had correct knowledge with regard to organ donation on questions related to cadaveric organ donation and HLA antigen, this was found to be statistically significant (p<0.05) (Table 1).
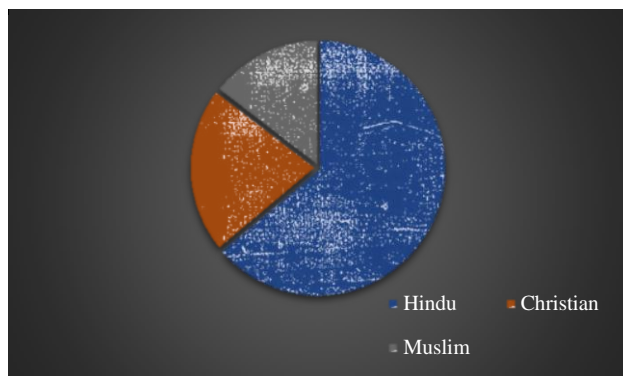
Figure 2: Showing religion wise distribution of students, Hindus (64%), followed by Christians (21%), and Muslims (15%).

Comparison of positive attitude responses revealed that girls had more positive attitude as compared to boys. However, there was a negative attitude by the girls as compared to boys on questions related to keeping the body intact after death, disfigurement of the body after death, willingness of the family for organ donation and religious laws that may stop them from organ donation and it was statistically significant (p<0.05). On questions regarding willingness to be an organ donor and their willingness to motivate their family members, first-year students had a poor attitude towards it as compared to other years students. A low positive attitude was seen towards cadaveric organ donation from the third-year students. Hindus reported higher positive attitude on organ donation and transplantation as compared to Muslims and Christians. However, Christians had a positive attitude towards organ donation adding meaning to one's life. Their attitude towards live organ donation was more positive as compared to Hindus and Muslims which was found to be statistically significant (p<0.05) (Table 2).

When knowledge regarding organ donation and transplantation was assessed, 22.4% of the students had good knowledge (>75%), 65.4% had average knowledge (50-75%) and 11.74% had poor knowledge (<50%). Hindus were found to have average to high level of knowledge (p<0.05) as compared to Christians and Muslims regarding organ donation and transplantation, which was found to be statistically significant. Comparison of attitude based on gender and year of study did not reveal any significant difference between them (p=0.24, p=0.81) (Table 3).
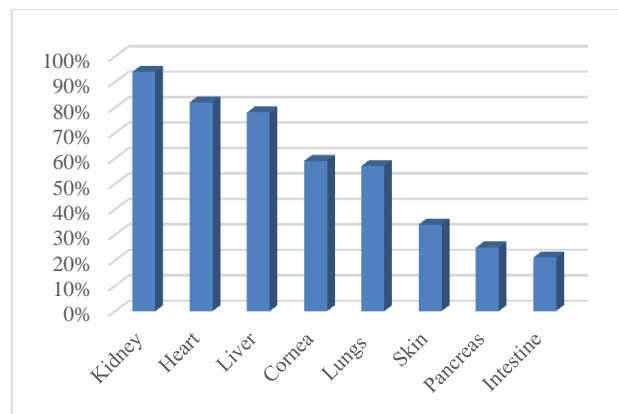
Figure 3: Knowledge of kidney donation was the highest (94%), followed by heart (82%), liver (78%), cornea (59%), lungs (57%), and skin (34%).

Knowledge of kidney donation was the highest (94%), followed by heart (82%), liver (78%), cornea (59%), lungs (57%), and skin (34%) (Figure 3).
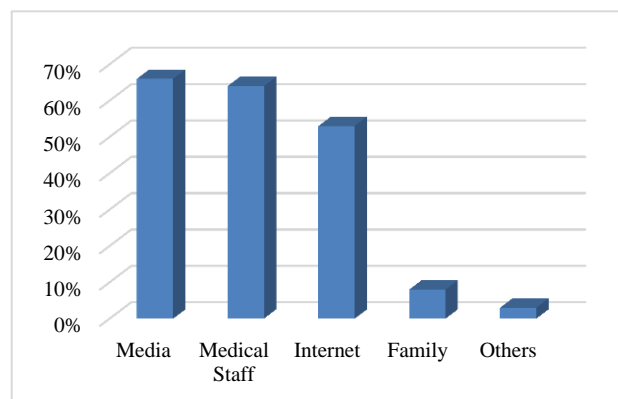
Figure 4: Sources of knowledge regarding organ donation, from media being the highest (66%), followed by medical staff (64%), internet (53%), family (8%) and others (2%).

Sources of knowledge regarding organ donation, from media being the highest (66%), followed by medical staff (64%), internet (53%), family (8%) and others (2%) (Figure 4).

DISCUSSION

Despite all advances in organ and tissue transplantation over the past decades, there are many patients waiting for an organ to become available for transplantation and the gap between available organs and patients awaiting transplantation is widening.[8] A study by Bapat et al on organ donation, awareness, attitudes and beliefs among post graduate medical students showed that majority (97%) of the medical students were aware of organ donation and transplantation.[9] Similar results were seen in this study, where irrespective of the year of study,

majority (84%) of the students were in knowledge of organ donation and transplantation.

In a study by Figueroa et al regarding the knowledge and changing attitude and beliefs towards organ donation, it was found that the media, i.e. newspapers (52%) was the most common source of information, followed by television (38%), medical staff (30%) and internet (24%).[10] Similarly, in our study, print form of media (66%) was the most common source of information, followed by medical staff (64%), internet (53%), and family (8%). In a study conducted by Ali et al on the knowledge and ethical perception regarding organ donation among medical students, it was found that kidney was the most commonly donated organ, followed by blood, cornea and heart.[11] A similar finding was seen in our study with the knowledge on kidney donation (94%) being the highest, followed by heart (82%), liver (78%), cornea (59%), lungs (57%), skin (34%) and pancreas (25%).

In our study, we took a step ahead, by comparing variables like gender, year of study and religion with responses related to organ donation. When gender comparison was done for knowledge scores, a higher mean score was observed among females as compared to males. Also, when correct knowledge was taken into account, more females (65.5%) had average knowledge when compared to males (60%). These findings do not concur with the results reported by Marques et al, on medical students attending university of Puerto Rico school of medicine where almost half (49.6%) of the male participants had adequate knowledge (>50%) compared to females (41.9%).[12] This difference could be due to variation in the country of study and higher female to male ratio in our study.

In our study, females had significantly (p<0.001) higher mean attitude scores than males. This finding is similar with the studies by Burra et al and Mekahli et al, on European medical students where females had higher positive attitude, as they may have more emotional values compared to males.[13,14] When religion was taken into consideration, Hindus (68%) had higher average knowledge scores (50%−75%) (p=0.03) than others, which contradicted with the results of the study by Marques et al, where higher knowledge scores was noted for Christians, which can be because of difference in socio-demographic characteristics between the countries.[10]

The present study showed poor attitude regarding organ donation amongst all religions, which is in contrast to the findings put forward by Kocaay et al.[6] regarding brain death and organ donation where 68.6% of the students of all religions had positive attitude towards organ donation. Poor attitude could be due to culture and religious practices in our country, as they play an important part in determining the level of organ donation.

CONCLUSION

Transplantation is a unique area of medicine in which the treatment is dependent on the generosity of potential donors and their relatives. This study found that the current level of knowledge of medical students on Organ Donation and Transplantation was inadequate, hence focus should be on including organ donation and transplantation lectures in the curriculum. Students had necessary knowledge regarding the topic but their attitude was poor, hence motivation is necessary in medical colleges towards organ donation. Since medical students are the future doctors, if they are motivated, they in turn can create awareness and motivate the general population and promote organ donation in the community, which is the need of the day.

Limitations

The study population represents only a small fraction of the medical community. So, the results available from this cannot be generalized for the whole community.

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Original Research Article

Assessment of awareness and attitude of rural women towards ill-effects of indoor air pollution and their perception regarding alternate cooking fuel usage in Mangalore

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ABSTRACT

Background: Indoor air pollution is typically underreported and less regulated than its counterpart. So this study was to assess the awareness and attitude of the study population towards ill effects of indoor smoke exposure among the study population and to assess the users' perception about other alternative fuels to be used to reduce the ill effects. Objectives of the study were to assess the awareness and attitude of the study population towards ill effects of indoor smoke exposure among the study population and to assess the users' perception about other alternative fuels to be used to reduce the ill effects.

Methods: It was a cross-sectional study conducted in the rural field practice area of K.S Hegde Medical Academy among the household women who spend the majority time cooking in their house. The study included 400 household women. Data was collected using a pre-tested, semi-structured questionnaire, and entered into MS Excel and analysed.

Results: Most (80.8%) of them were aware that exposure to smoke affects the health of those exposed to it. Also, their perception regarding alternate fuels was good. In the study most of the study participants (92.1%) were willing to change over to a cleaner fuel.

Conclusions: By raising their awareness towards the harmful effects of firewood smoke and providing awareness regarding government programmes for using cleaner fuels, the ill-effects on health of those involved in cooking can be reduced in future.

Keywords: Awareness, Attitude, Perception, Ill-effects, Indoor air pollution

INTRODUCTION

The nature of air in indoors affects the quality of life and the welfare of the population in general. Exposure to various indoor pollutants results in an increased risk for developing various ailments mainly affecting the respiratory system. Currently, people spend majority of their time working inside buildings, be at home, workplace, or school where they can get affected depending upon the quality of the air present indoors.[1]

In our country, young women staying at home are in peril due to the fact that they are in constant exposure to the various indoor pollutants, especially the homemakers who are constantly occupied with their duties both in and out of the house. In the present phase, where there are more of nuclear families, the time spent by her in domestic for duties will be considerably more. With more work in the house, the young women involved in domestic work breathe more air indoors in proportion to other members of the house adults.

Fuel sources in the developed countries tend to be clean, using materials such as gas and electricity. Here, problems of indoor air pollution are mainly from compounds such as nitrogen dioxide, by-products from tobacco smoke, volatile organic compounds, and other chemical compounds. Furthermore, in order to conserve energy and to sustain a constant indoor temperature, the windows of the buildings are not opened. As a result, presently there is a trend to design buildings with good insulation.[2] Hence, there wouldn't be a renewal of the indoor air. Since the channelling of contaminated air by indoor sources to the outer area of the building is prevented, the collection of polluted air rises subsequently inside the house.

As per World Health Organization (WHO) records, around 300 crore people prepare food using open fires and stoves burning wood, animal dung, crop waste and coal. More than 40 lakh people die prematurely from illness related to the household air pollution from cooking with biomass fuels.[3] There are lots of studies confirming that exposure to household air pollution can lead to a wide range of child and adult disease outcomes, including acute and chronic respiratory diseases such as pneumonia, chronic obstructive pulmonary disease, lung cancer, ischemic heart disease, stroke and cataract. There is also supporting evidence suggesting exposure to household air pollution is linked with adverse pregnancy outcomes, tuberculosis, cancers of the upper aero-digestive tract, cervical and other cancers.[4]

The importance of interventions to reduce exposure to indoor air pollution is reflected in the Millennium Development Goals (MDGs) in many ways which mention that: (i) Since the children under the age of five years are the most affected, there should be involvement of other methods of cooking to reduce child mortality (Goal 4). (ii) The process of aggregating fuel sources poses a major time burden on women and children and by removing this obstacle would contribute to promote gender equality and women empowerment (Goal 3). (iii) When the amount of time spent on fuel aggregation is reduced, people can spend more time for education and work thus increasing their income to eradicate poverty (Goal 1). (iv) The number of people depending on traditional fuels is one of the gauge to check their progress towards a future with clean energy solutions (Goal 7).[5]

While most media attention has focused on outdoor air pollution in the last few years, indoor air pollution (IAP) is typically underreported and less regulated than its counterpart. The association between indoor air pollution and various health consequences in children and grown-ups has been examined closely in the epidemiological and experimental literature. Many review articles have been published by national and international organizations as well as by experts within the field. Keeping the extent of ill effects of indoor smoke exposure in mind, this study was being conducted to find the extent of indoor smoke

problem among the rural population of Mangalore, as no such study has been carried out recently in this Medical Academy.

METHODS

This was a cross sectional study, which was conducted at two places namely Kuthar and Manjanady, that comes under the field practice area of K.S Hegde Medical Academy. After receiving approval from the institution's ethical committee, the cross-sectional study was carried out. This study was conducted over a period of 2 years from December 2015 to July 2017.

The study population included women more than 18 years of age who spent majority of their time in cooking. A total of 400 households were included in the study. The list of households and details regarding population was obtained from the Gram Panchayaths of Kuthar and Manjanady that come under the field practice area of K.S Hegde Medical Academy. Proportional probability sampling method was used to determine the sample size in each village. Accordingly, 216 households were studied from Manjanady and 184 households were studied from Kuthar. Simple random sampling was done for the selection of households.

Data collection was done in Kuthar and Manjanady villages by door to door visit. One participant who was involved in cooking and fulfilled the inclusion criteria was selected from each household for the study. The data was collected by interview method using a pretested, prestructured questionnaire after obtaining informed written consent from the participants. Data was collected from the households till the required sample size was achieved. To meet the above-mentioned objectives, a questionnaire was developed and the questionnaire consisted of the following sections. The first section contained questions on basic demographic characteristics, section two on household socio- economic characteristics, third section was on housing details, section four was regarding the type of fuel used, its usage and priority of fuel used, section five about ill-effects of indoor smoke exposure, section six on health hazard awareness and lastly, section seven was regarding the user's perception about alternative fuels

Statistical analysis

Data entry was done in MS Excel. The data sets were transferred into SPSS after data cleaning and recoding with data definitions. The data was analysed by Rates and Proportions.
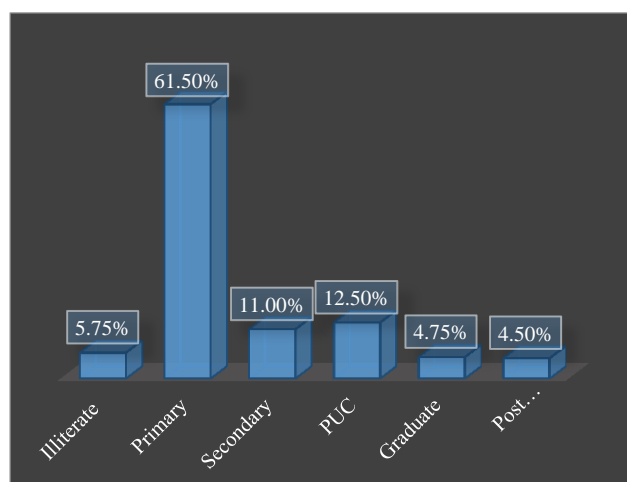
RESULTS

The mean age of the study population was 37.68±11.2 years with their age ranging from 18 years to 65 years as shown in Figure 1. Most of the study participants were

less than 30 years of age (30.0%) followed by 41-50 years (28.5%) and 31-40 years of age (21.3%).
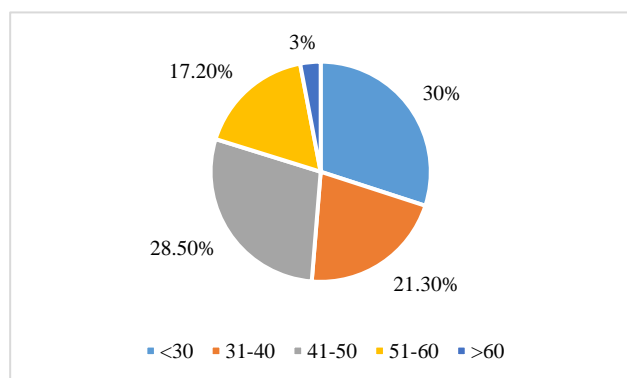
**Figure 1: Showing the mean age distribution population.**

Figure 2: Showing the educational status of the study population.
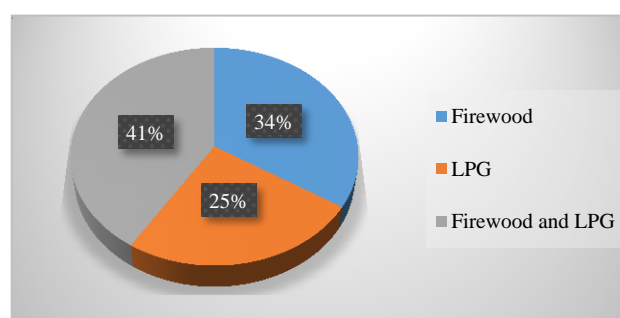
The majority of the study participants had primary school (61.5%), followed by pre-university (12.5%), and secondary school; 5.75% were illiterate as shown in Figure 2.

Most (70%) of the study participants were not working or employed, who were housewives. Around 4.75% of the study population were unskilled who were working as assistants in stationary and grocery shops. The semi-skilled women (17%) were the beedi workers and the skilled workers (3.75%) included tailors and ANMs; professionals (4.7%) were teachers, working in nearby schools.

Majority of the participants belonged to lower middle class socioeconomic status (32.0%), followed by the middle class (30.0%). Only 5% of the study population belonged to the lower class, which were mainly the manual labourers and the elderly population living alone who depended on their monthly pensions as shown in Figure 3.
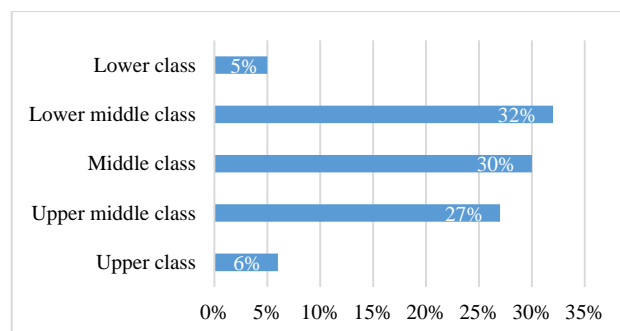
Figure 3: Showing the socio-economic classification of the study population (B.G. Prasad classification).

Figure 4: Showing the types of fuel used by the study population.

Among the types of fuels used for cooking by the participants, majority (41.3%) of the study participants relied on both firewood and LPG followed by individuals (34.3%) that depend only on firewood as shown in Figure 4. Due to high initial investment and lack of awareness, the number of LPG users (25%) are comparatively lower than the number of firewood users (Figure 4).
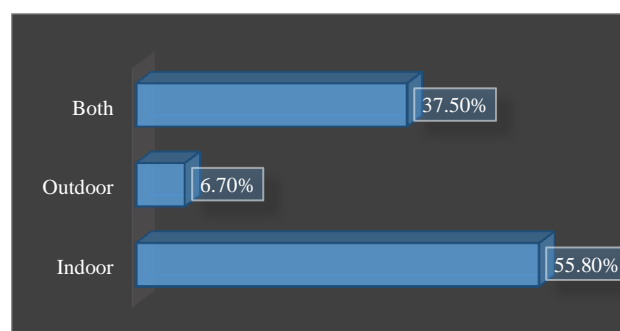
Figure 5: Showing the location of the cooking area in the households.

Considering the location of cooking by the study participants, majority of the cooking area was indoors (55.8%) followed by both indoor and outdoor cooking (37.5%) and outdoors only 6.7% as shown in Figure 5.

Considering the awareness of the study participants regarding indoor smoke, most (80.8%) of them was aware that exposure to smoke affects the health of those

exposed to it as shown in Table 1. Majority (87.5%) the women were aware that burning of firewood and agricultural waste produces more smoke than LPG. Regarding awareness of smokeless chulhas, only 78% were aware (Table 1).

Table 1: Table showing awareness of study participants towards indoor smoke.

Awareness of study population	Number of study participants	Percentage (%)
Cooking smoke affects health of each person		
-Yes	323	80.8
-No	77	19.2
Firewood and biomass fuels produce more smoke than LPG		
-Yes	350	87.5
-No	90	12.5
Awareness of smokeless chulha		
-Yes	312	78.0
-No	88	22.0

Table 2: Table showing attitude of study participants towards indoor smoke.

Attitude of study population	Number of study participants	Percentage (%)
Concern about effects of cooking smoke on self		
- Yes	341	85.2
- No	59	14.8
Willingness to change to a cleaner fuel if present fuel is producing smoke		
- Yes	367	91.7
- No	33	8.3

Table 3: Table showing user's perception about alternate fuel usage.

Perception about alternate fuels	Number of participants	Percentage (%)
Smokeless cooking fuels are better		
- Yes	338	84.6
- No	62	15.4
Fuel which produces more smoke should be changed		
- Yes	312	78.1
- No	88	21.9
Willingness to change to a cleaner fuel for good health		
- Yes	368	92.1
- No	32	7.9
Willingness to change to a fuel, which is healthy but expensive		
- Yes	247	61.8
- No	153	38.2

On concern about the harmful effects of smoke on themselves, majority (85.2%) of the household women were concerned about its harmful effects as shown in Table 2. Among the study participants, majority (91.7%) were willing to change to a cleaner fuel that does not produce any smoke (Table 2).

Among the study participants, majority (84.6%) felt that smokeless fuels are better than the ones producing smoke as shown in Table 3. When asked about their perception regarding changing the fuel that produces more smoke, 78.1% of the household women, responded positively. In the study most of the study participants (92.1%) were willing to change over to a cleaner fuel. When asked the study participants were willing to change over to a fuel which is healthy, but expensive, only 61.8% were willing (Table 3).

DISCUSSION

The present study was a community based cross-sectional study. The study population consisted of 400 women in the age group of 18 to 65 years, permanently residing in the rural field practice area attached to K.S Hegde Medical Academy, Mangalore. The mean age of the study population was 37.68±11.2 years. Most of the participants were aged less than 30 years, followed by 41–50 year age group (28.5%) and 31-40 year age group (21.3%). This study finding is similar to the study conducted by Chhabi Lal Ranabhat et al in Nepal, where the age group was between 15 and 65 years.[6] Also in the study, the most common age group was between the age of 21 and 30 years.

In this study, 61.5% had primary school education, 12.5% had pre-university education, 11% had secondary education, 4.75% were graduates and 4.5% were post-graduates. There were 4.2% illiterates in the study population. This was similar to the findings in the study conducted by S. Agrawal et al in Indian women where majority of the study participants had primary education (64%) followed by matriculation (15%), secondary education (10%) graduation (6%), post-graduation (2%) and 10% were illiterates.[7] A study conducted in rural Pakistan by Naveed Z Janjua et al also showed similar results to our study where majority of the study participants attended only till primary school (70.8%), followed by 11% till 12th class, 15% till secondary school.[8]

In this study, socio-economic class distribution according to the Modified B.G Prasad classification in the study population showed that, majority of the women were in the lower middle class (32.0%), followed by middle class (30.0%), upper middle class (27%), 6% in the upper class and the remaining 5% from the lower class. The lower class population were mostly manual labourers, and they depended on the biomass fuels and charcoal for cooking. Similar findings were seen in a study conducted by M. Edelstein et al in rural Maharashtra where, majority of the

study population were from the lower middle class (47%), followed by 26% from the middle class, 10% from the upper middle class, 14% from the lower class and 3% from the upper class.[9] Also in a study conducted by Lakshmi P. V et al the study population consisted of 53% from the lower middle class, 29% from the middle class, 2% from the upper class, 6% from the upper middle class and the remaining 12% from the lower class.[10]

In this study, it was found that 34% of the study population were using firewood, 25% were on LPG, 41.3% were using both firewood and LPG for their cooking needs. In a study conducted by Po, J.Y.T et al in northeast India, the study population using firewood and charcoal were comparatively more (45%), LPG users were only 20% and people using both firewood and LPG were 35%.[11] An initial high investment to procure the stove and cylinder could be the reason why most of the people, especially that in low socio-economic status still prefer firewood for their cooking purposes.

In our study, indoor cooking was practiced by 55.8% of the study population, outdoor cooking was done by 6.7% and 37.5% cooked both indoor and outdoor. Most of the study participants who cooked both indoor and outdoor, prepared rice and boiled water outdoors while other food items were cooked inside the house. Similar findings were seen in a study conducted by Balakrishnan K et al in southern India, where majority (67%) of the study population cooked indoors, 29% cooked both indoors and outdoors and the remaining 4% cooked outdoors.[12] Also in another study conducted by Dutta et al. [13] among Indian women, 73% of the study population were cooking indoors, 24% cooked both indoors and outdoors and the remaining 3% cooked outdoors.

In our study, we have assessed the awareness and attitudes of the study participants regarding indoor smoke, and found that 80.8% of the study population were aware of the health risks posed by the smoke from burning firewood. Majority (87.5%) the women were aware of the increased smoke production from burning firewood. Regarding smokeless chulhas, only 78% of the study population were aware of it. 85.2% of the study population were concerned about the harmful effects of smoke on themselves. 91.7% were willing to change over to a clean fuel that doesn't produce any smoke. In a study conducted by Bijoy Krishna Banik in rural Bangladesh, it was found that majority (85%) of the household women had good awareness and attitudes regarding the harmful effects of burning firewood.[14] It was found that they were aware of the smoke production from firewood as compared to LPG. Most (76%) of the study participants were concerned about the health risks due to the burning of firewood and were willing to change over to a better fuel that produces less smoke. Rhodes et al conducted a study in Peru, Nepal and Kenya where it was seen that even though the study participants had good awareness and attitude, the practice was not possible due to the economic constraints.[15] The study participants were aware of the smoke production produced from burning of firewood. Only 60% were concerned of the health risks posed by exposure to the smoke.

In our study, majority (84.6%) of the study participants felt that smokeless fuels are better than the ones which produce smoke. Their perception about alternate fuel usage was good (78.1%). Most of the study participants (92.1%) were willing to change over to a clean fuel. Only 61.8% of the study participants were willing to change over to a cleaner fuel which is also expensive. In the study conducted by Jacqueline Hollada et al it was seen that most (89%) of the study participants were comfortable with smokeless fuels than firewood.[16] Also majority of the women who were still using firewood were willing to change over to cleaner fuels. It was also found that 56% of the households were willing to change over to a healthy but expensive fuel for their daily cooking. In a similar study by Wickramasinghe in Sri Lanka, it was seen that majority (90%) of the study participants preferred smokeless fuels over firewood.[17] Their perception about alternate fuels were good. Most of the study participants were willing to change over to a fuel that produces less smoke and 65% were willing to change over to a healthy and expensive fuel.

CONCLUSION

On assessing the awareness and attitudes of the study participants regarding indoor smoke, most (80.8%) of them were aware of its ill-effects. 91.7% were willing to change to a cleaner fuel, but only 61.8% of the participants were willing to change over to a fuel which is healthy and expensive. It was found that only 78% were aware about smokeless chulhas.

Limitations

Cigarette smoke also contributes to indoor air pollution which was not assessed in this study.

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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.
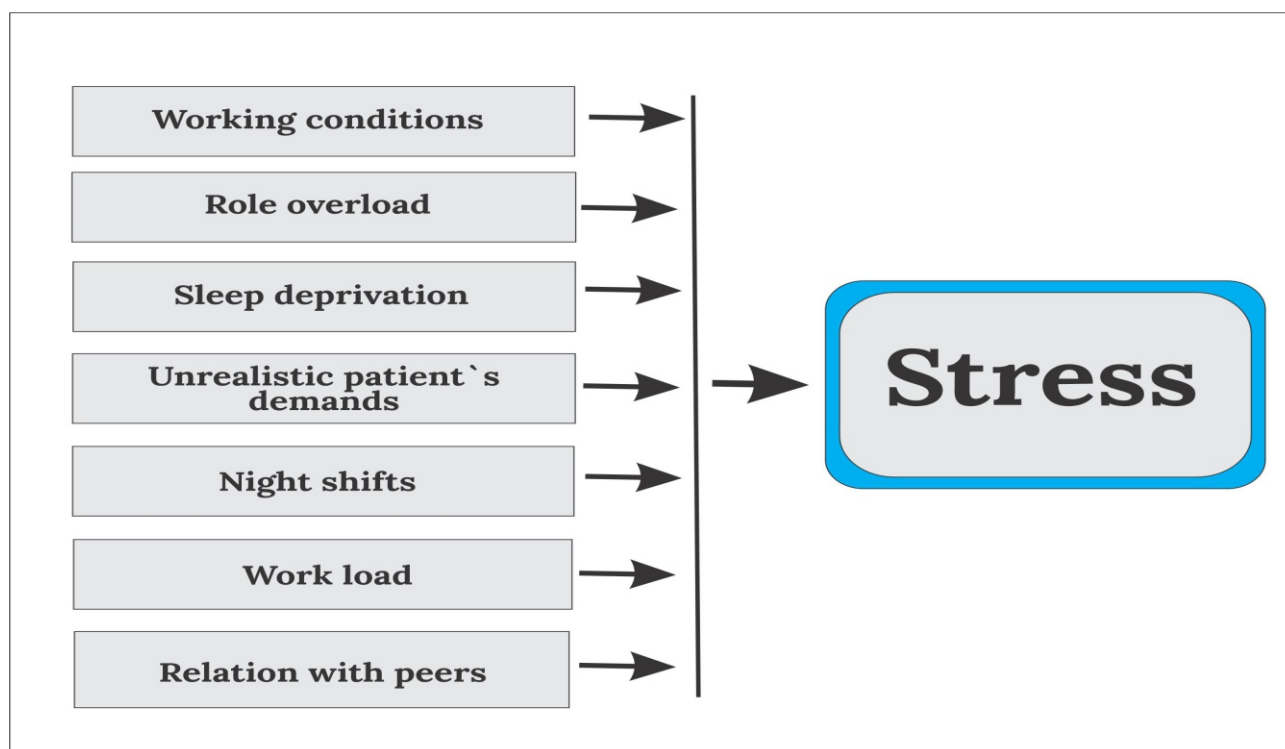
Figure 1: factors responsible for stress in doctors
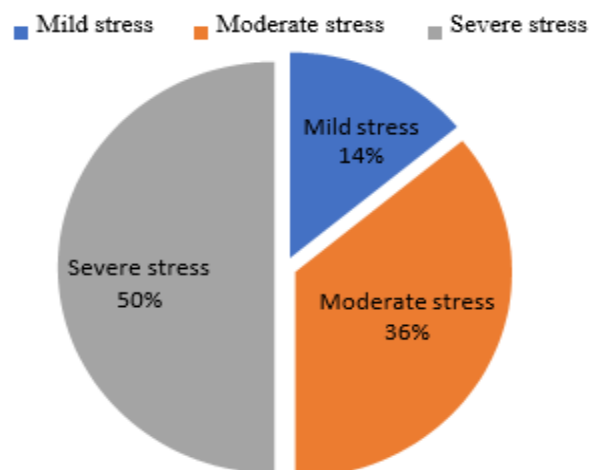
Figure 2: Distribution of stress levels among study population

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,
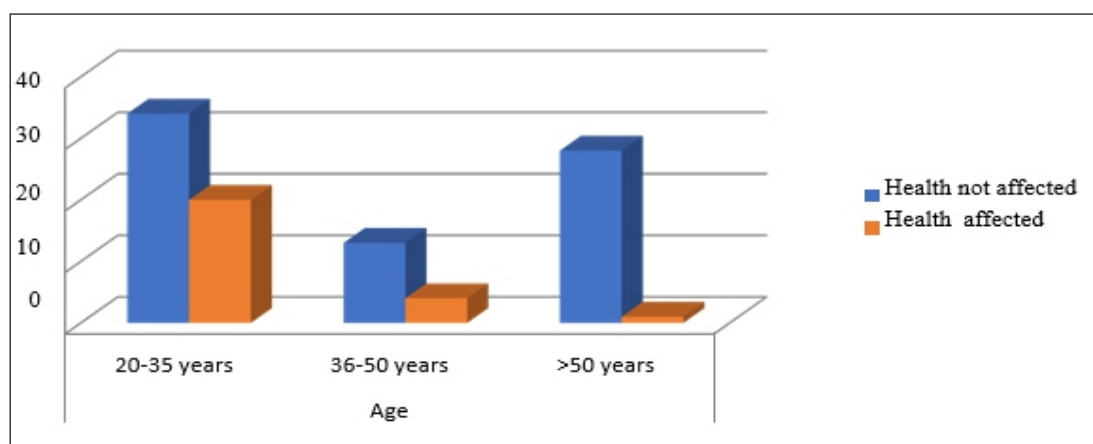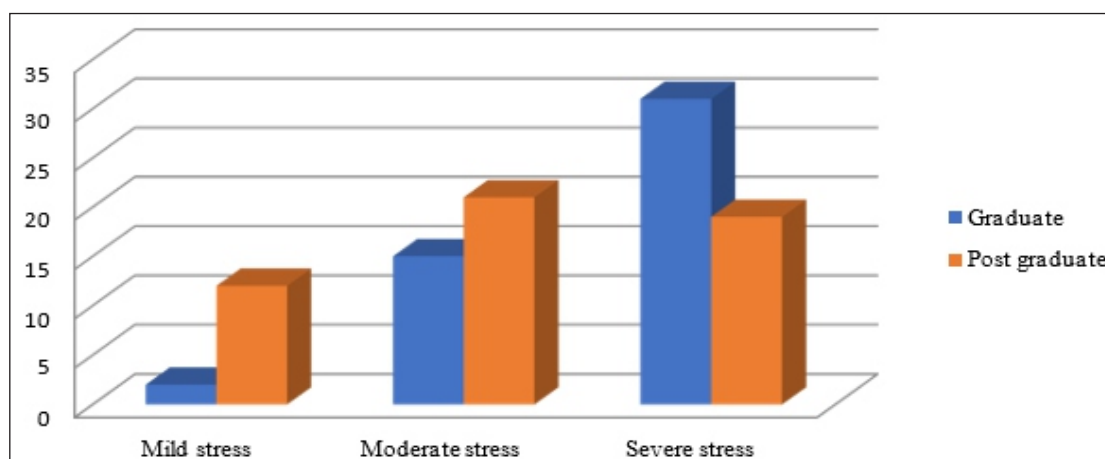- **Score more than 30** meaning commonly experienced stress symptoms have effect on individuals' health.

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 20th to November 20th 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.

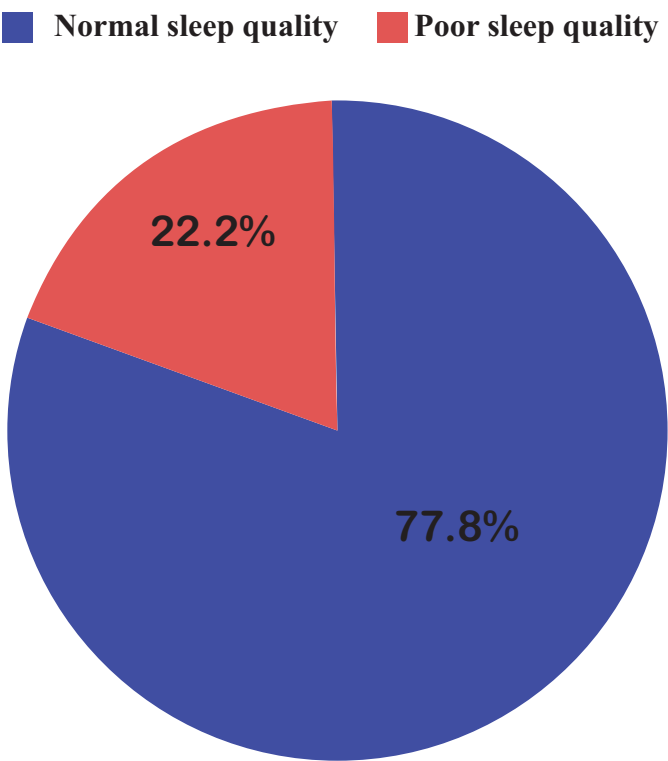**Normal sleep quality** **Poor sleep quality**

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).**

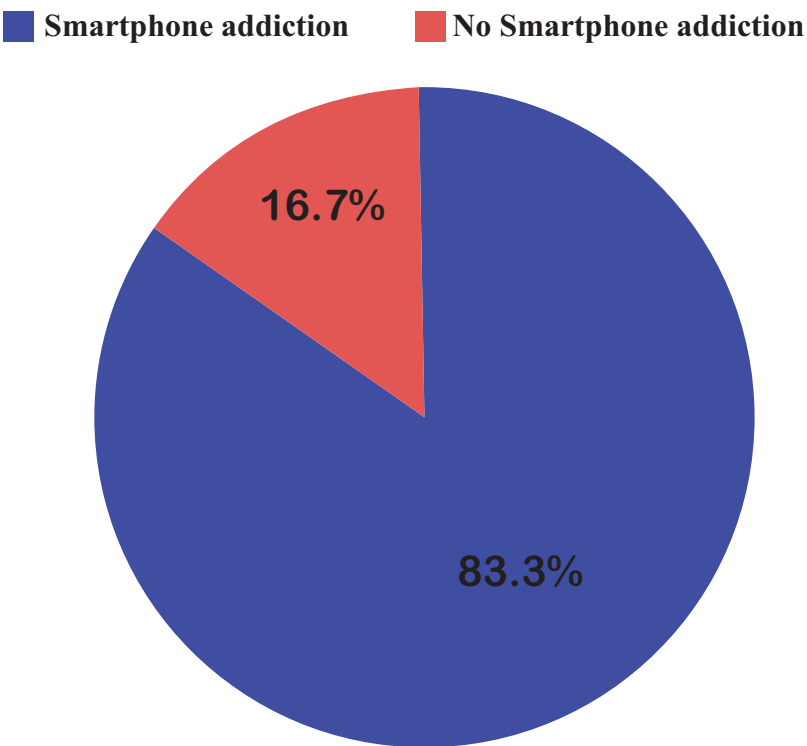**Smartphone addiction** **No Smartphone addiction**

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 fi-

-nding 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

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

quality was associated with poor academic performance [31-33].
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

Ethical Clearance

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