Prevalence of Musculoskeletal Pain Among Academic Staff of Mekelle University, Ethiopia

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ABSTRACT

BACKGROUND: Musculoskeletal pain is a leading cause of morbidity, low productivity. Thus; not only affecting the individual's quality of life; it also creates a burden in the health system and affects the productivity of their institution and the country at large. The prevalence of musculoskeletal pain among academic staff in developed countries ranges from 47% to 85%. However, there was a scarce of studies in developing country, particularly in the study area.

PURPOSE: the aim of the research was to assess the burden of musculoskeletal pain and associated factors among Mekelle University academic staff.

PATIENTS AND METHODS: An institutional based cross-sectional study was enrolled on 449 participants with a response rate of 92.2%. Multistage sampling technique was deployed to select representatives. Participants under the selected schools, institutes and departments were selected using random sampling method. Data was collected through face to face interview using structured and standardized Nordic questionnaire by trained data collectors at Mekelle University. Binary logistic regression was used to assess the association between dependent and independent variables. In bivariate logistic regression variables which have *P* value of <.25 were modeled to multivariate logistic regression. Those variables with *P*-value of <.05 with 95% CI in multivariate model were taken as statistically significant.

RESULTS: This study found that burden of musculoskeletal pain among Mekelle University academic staff in the previous 12 month was 65.2%, and in the last 7 days was 29%. Neck pain (41.5%) was most prevalent followed by low back pain (40.3%). Female gender (OR = 3.02, 95% CI: 1.58-5.76), Body mass index ⩾25 (OR = 3.68, 95% CI: 1.15-11.39), working hours per day (OR = 3.1, 95% CI: 1.54-6.38), and physical inactivity (OR = 3.48, 95% CI: 1.69-7.16), were the independent factors positevly associated with musculoskeletal pain.

CONCLUSION: The burden of musculoskeletal pain among Mekelle University academic staff was common. Female gender, being overweight and obese, working >5 hours per day, and being physically inactive increase the odds of experiencing musculoskeletal pains among academicians. Therefore the university authorities and all academicians are recommended that to take preventable measures of musculoskeletal pain.

KEYWORDS: Musculoskeletal pain, burden, academicians, associated factor, Ethiopia

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Introduction

Musculoskeletal pain (MSP) is inflammatory and degenerative condition that can be affecting the neuro-musculoskeletal structures of the body manifested by pain mainly in the muscle, tendons, ligaments, and joints.[1,2] In 2020, MSP has been projected that disabilities which are caused by MSP will predispose adult workers to serious public health and societal issues.[3,4]

Systematic analysis of the global burden of disease study in 2010 indicated that MSP increase the risk of disability by 45% from 1990 to 2010 globally.[5] Pain has a great impact to individuals and society through the associated disability, comorbidity loss of job, and healthcare needs.[6] One year prevalence of MSP among professors of Petrolina, Brazil was 85.7% and 64.3% of them have symptoms that worsen with teaching activities.[7] The prevalence in the university environment was high compared to primary and secondary school teachers (55 %).[8] Another study in Malaysia assesses the annual prevalence of upper limb pains (ULDs) in University set up among different job categories reported that was: among lecturer (70%), drivers (63.6%), and administrative staffs (58%).[9]

World Health Organization (WHO) has mentioned that multifactorial risk factors were responsible for MSP among adult workers all over the world such as: prolonged awkward posture, some degree of body shaking, being involved in repetitive activities,[10] computer use related musculoskeletal discomfort.[11-13] Researchers identify the possible reason for the increase in pain intensity among academic staff is: prolong standing, writing, reading, and repetitive work which characterized the nature of work of academician's overtime these may lead to repetitive injury and increase pain intensity.[14]

The associated factors of MSP among academic staff are contradicted within studies and different from place to place,

setups and time; older age, female gender, unstable health condition, teaching experience, poor ergonomic during work, and job stress are the common associated factors of MSP among university academic staff.[9,11,15]

A significant researches has been conducted on the magnitude and associated factors of MSP on academicians in developed countries. But, it is difficult to understand the burden of MSP in developing countries, because evidences on the magnitude and associated factors of MSP among the countries like Ethiopian academicians is still scarce. Hence this study aims to assess the prevalence and associated factors of MSP among Mekelle University academic staff.

Materials and Methods

Study design and setting

An institutional based cross-sectional study design was conducted at Mekelle University found in Northern Ethiopia, around 780 km from capital city Addis Ababa. Mekelle University is the one among the growing government-funded universities in Ethiopia. It has 2103 number of academic staff (1673 males and 430 females) in 5 campuses.[16] This study was conducted from 15th April to 22nd May 2019 at Mekelle University.

Study population

Academicians who are working at Mekelle University at the proportionally selected departments who were randomly interviewed during data collection were a study population.

An Ethiopian academic staff having at least 1 year of teaching experience from schools business and economics, school of medicine and nursing, departments of engineering (electrical, civil, information technology), and aschool of veterinary Medicine was included in this study. Academicians with trauma or injury of for the previous 6 months, and known pregnant women's were excluded from this study.

Sample size and sampling technique

The sample size for this study was calculated by Epi info stat calc version 7 using the assumption of 71.7% expected prevalence,[9] 5% marginal error, with a total number of population 2103, 10% non-response rate, 1.5 design effect and based on this assumption, the sample size was calculated using single population proportion formula; the final calculated sample size was four hundred forty nine (449).

Multistage sampling technique was used to select representatives from all 5 campuses of Mekelle University, and proportional stratified allocation was used to select the schools, institutes and departments from each campus. Then the final sample size was randomly selected for each proportionally allocated schools and departments. Lastly, simple random sampling technique was used to select the study participants.

Data collection procedure and quality control issues

Data was collected through face to face interview using structured questionnaire by trained BSc physiotherapists and supervised by expert MSc physiotherapists. The questionaire had 4 sections; socioademographic, behavioral, work related/mechanical (working hour per day, working days per week/per month, additional task, ergonomic training, usual working position, break between activities, hours for computer use), and Musccuskeletal pain (MSP). Tools used to assess MSP was adapted from the standardized Nordic questionnaire and modified to local context.[17] Measurements of height and weight was done using weight stadiometer. Weight was measured using floor weighing scale (Electrolux, Korea) with participants standing without shoes and wearing light clothing and recorded to the nearest 0.5 kg. Height was measured using stadiometer at standing upright with the head in the Frankfort plane (A standard craniometric reference plane passing through the right and left porion and the left orbitale) and recorded with an approximation of 1 cm.

To maintain the quality of the data, the data collectors and supervisors were trained for 1 day on how to approach study participants and how to use the questionnaire. Supervision was also done on the spot by the principal investigator. Pre-test was done to check for the accuracy of responses, language clarity, and appropriateness of the tools with 5% of the total sample size at Sheba University College in Mekelle. The data was checked for its completeness, accuracy, and clarity before data entry and the data cross-checking was done before analysis.

Data processing and analysis

The data was coded and entered using epi info version 7 and after cleaning it exported to the Statistical Package for the Social Sciences (SPSS) Version 20 for further analysis. Descriptive statistics were computed using frequencies with percentages for categorical variables, mean and standard deviations for continuous variables. Multivariate logistic regression was employed to show the relationship between dependent and independent variable. In bivariate logistic regression analyzes, variables with P-value $<.25$ were considered as potential candidates in the final multivariable logistic regression analysis. In multivariable logistic regression analysis, those variables with P-value of $<.05$ were considered statistically significant. Finally AOR with 95% of confidence interval at P value of $<.05$ was reported. The findings of the study were presented with texts and tables. Multi-collinearity test was also checked to assess the correlation between the independent variables. STROBE (STrengthening the Reporting of OBservational studies in Epidemiology) cross sectional reporting guidelines was used to assess the paper components of the manuscript.[18]

Operational definitions

In this study musculoskeletal pain was any pain and/or discomfort at least ones a time during the previous 12 months in at

Table 1. Socio demographic and personal characteristics with a distribution of MSP among Mekelle university academic staff in Mekelle, Tigray, Ethiopia, 2019 (n = 414).

VARIABLES		FREQUENCY	PERCENT	PAST 12 MONTHS PREVALENCE OF MSP	
				YES	NO
Gender	Women	116	28%	86 (74.1%)	30 (25.9%)
	Men	298	72%	184 (61.7%)	114 (38.3%)
Age group	23-30	202	48.8%	118 (58.4%)	84 (41.6%)
	31-40	163	39.4%	117 (71.8%)	46 (28.2%)
	41-50	39	9.4%	30 (76.9%)	9 (23.1%)
	>50	10	2.4%	5 (50%)	5 (50%)
Marital status	Single	210	50.7%	121 (57.6%)	89 (42.4%)
	Married	204	49.3%	149 (73%)	55 (27%)
Medically diagnosed disease	Yes	37	8.9%	32 (86.5%)	5 (13.5%)
	No	377	91.1%	238 (63.1%)	139 (36.9%)
Body mass index (BMI)	Underweight	35	8.5%	17 (48.6%)	18 (51.4%)
	Normal	312	75.4%	197 (63.1%)	115 (36.9%)
	Overweight and obese	67	16.2%	56 (83.6%)	11 (16.4%)
Work experience in year	⩽5	237	57.2%	146 (61.6%)	91 (38.4%)
	6-10	121	29.2%	86 (71.1%)	35 (28.9%)
	>10	56	13.5%	38 (67.9%)	18 (32.1%)
Working hours per day	⩽5 h	87	21%	27 (31%)	60 (69%)
	6-10 h	307	74.2%	227 (73.9%)	80 (26.1%)
	10-14 h	20	4.8%	16 (80%)	4 (20%)
Monthly income (in Birr)	<10 000	97	23.4%	52 (53.6%)	45 (46.4%)
	10 000-13 000	201	48.6%	137 (68.2%)	64 (31.8%)
	>13 000	116	28%	81 (69.8%)	35 (30.2%)
Level of educations	Bachelor	105	25.4%	60 (57.1%)	45 (42.9%)
	Masters	272	65.7%	188 (69.1%)	84 (30.9%)
	PhD	37	8.9%	22 (59.4%)	15 (40.6%)

least 1 body part of the body (neck, shoulder, upper back, elbow, lower back, wrist/hand, hips/thighs/, knee and ankle/feet).

University Academic Stuff- Professionals who are involved in an acadamic activity (teaching/learning, reseach, and community service) in the university set up. In Ethiopia universities the education status of acedamic stuff is from Graduate assistant lecturer to Professor.[2]

Prevalence: it is defined as the previous 12 months prevalence of musculoskeletal pains.[19]

Results

Socio-demographic and personal characteristics of the participants

From a total of 449 academicians, 414 of them completed the interview giving the response rate of 92.2%. Most of them 298 (72%) were males and the mean age of the respondents was 32.9 (SD ± 7 years). Nearly fifty percent (202) of the participant's age is falling into 23-30 years old. Regarding with educational status, most of academic staff 272 (65.7%) were master's degree holders and more than half of study participants 237 (57.2%) had 1-5 years of working experience. Other detailed socio demographic and personal characteristics of academic staff is described below (Table 1).

Mechanical and behavioral factors of academicians

From 414 respondents; about 136 (32.9%) of them uses sitting with back support as their usual working position, more than half of the study participants 231 (55.8%) were used computer for <5 hours in a day. More than half of participants 219 (52.9%), have additional tasks at Mekelle University other than teaching. From academicians who have additional tasks 62

Table 2. Mechanical and behavioral factors with a distribution of MSP among academic staff at Mekelle University, Tigray- Ethiopia 2019 (n = 414).

VARIABLES		FREQUENCY (N)	PERCENT (%)	PAST 12 MONTHS PREVALENCE OF MSP	
				YES	NO
Usual working position	Sitting upright	60	14.50%	43 (71.7%)	17 (28.3%)
	Sitting with back support	136	32.90%	76 (55.9%)	60 (44.1%)
	Walking around and standing in the same place	200	48.30%	136 (68%)	64 (32%)
	Standing and bending forward	18	4.30%	15 (83.3%)	3 (16.7%)
Computer using hours per day	<5 h	231	55.80%	134 (58%)	97 (42%)
	⩾5 h	183	44.20%	136 (74.3%)	47 (25.7%)
Taking a break between activities	No	61	14.70%	53 (86.9%)	8 (13.1%)
	Yes	353	85.30%	217 (65.1%)	136 (38.5%)
physical activity (>150 min per week)	Physically inactive	349	84.30%	240 (68.8%)	109 (31.2%)
	Physically active	65	15.70%	30 (46.2%)	35 (53.8%)
Habits of smoking	Smokers	13	3.10%	13 (100%)	0 (0%)
	Nonsmokers	401	96.90%	257 (64.1%)	144 (35.9%)
Having additional tasks	Yes	219	52.90%	168 (76.7%)	51 (23.3%)
	No	195	47.10%	102 (52.3%)	93 (47.7%)

(28.3%) of them participate in clinical activity. In terms of physical exercise only 65 (15.7%) of academicians do ⩾150 minutes of physical exercise per week (Table 2).

Prevalence of musculoskeletal pain among Mekelle University academicians

Prevalence of previous 12 months MSP among Mekelle University academicians was 65.2%, with 95% CI: (60.4%-69.8%). The highest prevalence was observed in the neck area 172 (41.5%), followed by Lower back 167 (40.3%) and the lowest prevalence was observed in elbow 6 (1.4%). Meanwhile more than 10.4% (43) of the participants were absent from work due to MSP in the previous 12 months. And most of them were due to pain at their lower back and neck 4.3% and 3.9%, respectively. From academician who reported computer related MSP 47 (11.4%) of participants has neck pain and 28 (6.8%) of participants has low back pain (Table 3).

Factors associated with musculoskeletal pains among Mekelle University academic staff

In bivariate logistic regression analysis, self-reported MSP was significantly associated with: age, sex, marital status, BMI, level of education, work experience, working hours per day, break between activities, computer using hours per day, physical activity, monthly salary, medically diagnosed disease, additional tasks, and usual working positions (Table 4).

Table 3. Previous 12 months prevalence of MSP in different body parts among Mekelle University academic staff, Tigray, Ethiopia 2019 (n = 414).

BODY REGIONS		PREVALENCE OF PREVIOUS 12 MONTHS MSPS	COMPUTER RELATED MSPS IN THE PAST 12 MONTHS
Neck	Yes	172 (41.5%)	47 (11.4%)
	No	242 (58.5%)	367 (88.6%)
Shoulder	Yes	85 (20.5%)	36 (8.7%)
	No	329 (79.5%)	378 (91.3%)
Elbow	Yes	6 (1.4%)	0 (0%)
	No	407 (98.3%)	414 (100%)
Wrist/hand	Yes	26 (6.3%)	15 (3.6%)
	No	388 (93.7%)	399 (96.4%)
Upper back	Yes	64 (15.5%)	20 (4.8%)
	No	350 (84.5%)	394 (95.2%)
Lower back	Yes	167 (40.3%)	28 (6.8%)
	No	247 (59.7%)	386 (93.2%)
Hip and thigh	Yes	17 (4.1%)	2 (0.5%)
	No	397 (95.9)	412 (99.5%)
Knee	Yes	26 (6.3%)	1 (0.2%)
	No	388 (93.7%)	413 (99.8%)
Ankle	Yes	21 (5.1%)	4 (1.0%)
	No	393 (94.9%)	410 (99.0%)

Table 4. Factors associated with MSP among academic staff at Mekelle University Tigray, Ethiopia, 2019 (n = 414).

VARIABLES		COR (95% CI)	AOR (95% CI)	*P* VALUE
Gender	Men	1	1	
	Women	1.78 (1.103-2.861)	**3.02 (1.584-5.768)***	**.001**
Age	23-30	1	1	
	31-40	1.81 (1.165-2.815)	1.35 (0.581-3.158)	.482
	41-50	2.37 (1.071-5.258)	2.22 (0.512-9.667)	.079
	>50	0.71 (0.2-2.537)	1.01 (0.119-8.561)	.993
Marital status	Single	1	1	
	Married	1.99 (1.319-3.011)	0.91 (0.467-1.764)	.775
BMI	Normal	1	1	
	Underweight	0.55 (0.273-1.112)	0.42 (0.147-1.213)	.109
	Overweight	2.97 (1.496-5.902)	**3.62 (1.150-11.39)***	**.028**
Work experience	1-5 years	1	1	
	6-10 years	1.71 (0.955-2.456)	1.06 (0.434-2.609)	.893
	11-20 years	1.46 (0.709-2.443)	0.80 (0.216-2.98)	.743
Working hours per day	1-5 h	1	1	
	6-10 h	6.31 (3.74-10.61)	**3.14 (1.54-6.38)***	**.002**
	11-14 h	8.89 (2.72-29.10)	**7.01 (1.09-15.16)***	**.04**
Medically diagnosed disease	No	1	1	
	Yes	3.74 (1.42-9.82)	4.29 (0.99-18.68)	.052
Level of education	BSc	1	1	
	MSC	1.68 (1.055-2.67)	0.21 (0.014-3.02)	.249
	PhD	1.1 (0.51-2.35)	0.05 (0.02-1.03)	.052
Monthly salary	<10 000	1	1	
	10 000-13 000	1.85 (1.13-3.05)	5.51 (0.37-83.09)	.217
	>13 000	2.01 (1.14 -3.52)	4.40 (0.25-78.78)	.314
Doing physical activity (>150 min per week)	Yes	1	1	
	No	2.57 (1.51-4.39)	**3.49 (1.69-7.2)***	**.001**
A break between activities	Yes	1	1	
	No	4.15 (1.92-9.01)	1.62 (0.59-4.4)	.343
Computer using hours per day	<5 h	1	1	
	⩾5 h	2.09 (1.373-3.19)	1.81 (0.99-3.31)	.053
Having additional tasks	No	1	1	
	Yes	3.01 (1.97-4.58)	1.71 (0.79-3.68)	.17
Usual working positions	Sitting upright	1	1	
	Sitting with back support	0.50 (03-0.97)	0.68 (0.25-1.91)	.469
	Standing at the same place and walking around	0.84 (0.45-1.59)	0.84 (0.319-2.23)	.733
	Standing and bending forward	1.98 (0.51-7.71)	0.88 (0.13-6.09)	.901

Abbreviations: COR, Crude Odds Ratio; AOR, Adjusted Odds Ratio, *=Significant Association (on multivariate), 1 = Reference.

In multivariate logistic regression analysis (where all independent variables which were significant in bivariate logistic regression were included in the model that is Adjusted Odds Ratio [AOR]), self-reported MSP was significantly associated with female gender (AOR = 3.02, 95% CI: 1.58-5.77), overweight and obese (AOR = 3.69, 95% CI: 1.15-11.39), working for 6-10 hours per day (AOR = 3.1, 95% CI: 1.54-6.38), and physical inactivity (AOR = 3.483, 95% CI: 1.69-7.16) at *P*-value of <.05 (Table 4).

Discussion

This study was conducted to assess the prevalence and associated factors of MSP among Mekelle University academic staff in Tigray, Ethiopia. The prevalence of MSP in the previous 12 months was 65.2%, 95% CI: 60.4%-69.8%. Neck pain (41.5%) was the high prevalence observed, which followed by low back pain (40.3%) and shoulder pain (20.5%) among academicians.

The prevalence of this study was lower than studies conducted among academicians in: University of Limerick, Republic of Ireland 85%.[15] University of Pernambuco, Brazil 85.7%,[7] Mara University, Malaysia 78.9%,[1] and Obafemi University, Nigeria 71.7%.[9] This variation maybe due to a difference in: data collection methods, sample size and sampling techniques. For instance, Ireland study uses an online survey (which is self reported, and the participants can remember their previous pain/discomfort) to collect data from study participants, instead this study used face to face interview (may have interveiwer bias) including measurements for height and weight. Besides, there is methodological and participant's characteristic difference between Brazilian study, Nigerian study and this study. Brazilian study uses small sample size (49), data was collected through self-reported questionnaire; in the contrary; this study uses large sample size (414), data was collected through face to face interview. In addition, Nigerian participants were teaching and non teaching members of staff employed in the service, but in this study the participants were only teaching staff.

A pilot study from Malaysia use convenient sampling techniques to recruit academicians with higher proportion of women participants (66.7%), meanwhile, the current study use simple random sampling techniques to recruit academicians with small proportions of female participants (28%). The Nigerian study collects data only from (120) academicians by using non-probability sampling tequniques, but the current study include large number of academicians (414) by using probability sampling tequnique. It is also known that the prevalence of MSP among academicians in higher teaching institutes may depend on the work setting, work environment as well as ergonomic setups.

Hence the results of this study was higher than a study done in Saudi Arabia 55%.[2] The possible explanation for this difference might be due to a Saudi Arabian study use convenience sampling technique to recruit few academicians (60) and the data was collected through self-administered questionnaire. Instead, the present study uses simple random sampling technique to recruit more (414) academicians, we also use face to face interview including height and weight measurements.

In this study, there was a significant association between female academicians and MSP. Female academicians were 3 times more likely to develop MSP than male academicians with odds of 3.02, 95% CI: 1.58-5.77 at p-value of 0.001. These result is in line with studies done in: China,[20] Saudi Arabia,[2] Turkey, and Botswana.[8,21] These maybe due to biological differences between gender such as, body size, muscular capacity, hormonal condition, work-life balance and increased biological vulnerability of females than males, furthermore, evidence are suggesting that women have high level of sensitivity to pain and they are being exposed to different risk factors at home and at work.[22,23] On the contrary; one study from Malaysia reported that there is no significant association between gender and ULDs. This difference maybe due to Malaysian study uses a sample size of (271) academician, most of the participants was females (72.7%) and most importantly the study only asses ULDs.[12]

Academicians who were overweight and obese had 3.6 times more chance to develop MSP than academicians who have normal body weight with odds of 3.69, 95% CI: 1.15-11.39 at *P*-value .028. These is in line with studies done in: Norwey,[24] Malysia,[12] Saudi arabia and Iran.[2,25] Hooper et al, mentioned that overweight and obese individuals use their upper limb to transfer a body weight when arising from a seating position, which can resulting in upper extremity symptoms.[26] Being overweight may cause some sort of functional limitations, have negative influences on the control of locomotion, postural stability, balance and muscle strength which could be the possible reason for the high percentage of pain among overweight and obese academician. In contrast, other studies were showed that there were no significant association between MSP and BMI.[27,28] The possible explanation for these finding could be that overweight and obese workers may not be physically active so that the chance of developing MSP might be less in these group of workers.[29]

The finding of this study showed that academic staffs who works for 6-10 hours in a day had 3.1 times more likely to develop MSP with odds of 3.1, 95% CI: 1.54-6.38 at *P*-value of .002. And those who work 10-14 hours in a day had 7.1 times more likely to develop MSP with odds of 7.11, 95% CI: 1.09-15.16 than academicians who works for <6 hours. These result also supported by a study done in Brazil and Malaysia.[1,7] Working for a long period of time without changing position may predispose academicians to micro trauma and soft tissue injury. The impact of soft tissue injury can cause pain and increase the risk of MSP.[30]

Concerning to physical activity; physically inactive participants were 3.4 times more likely to develop MSP with the odds of 3.48, 95% CI: 1.69-7.16 at .001 *P*-value. This is in line with a study done in: Republic of Ireland,[15] Brazil and Saudi Arabia.[2]

With time, regular exercise can make the muscles stronger which increased the muscle action to against work load stress and pain or discomfort during repetitive works.[31,32] It could be the fact that sedentary life can lead to poor muscular strength; it also exposes the muscles to muscular spasm and tiredness which can possibly increase the risk of MSP.[2]

Conclusion

In conclusion, there is a moderate prevalence of MSP among Mekelle University Ethiopian academic staff's, neck pain was most prevalent followed by low back pain. Female gender, being overweight and obese, working >5 hours in a day, and physical inactive increase to experience MSP among academicians. Therefore the university authorities and all academic staff are recommended that to take preventable measures (having group regular exercise in and out of the campus) of musculoskeletal pains with further experimental researches.

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Authors' Contributions

All authors contributed to data analysis, drafting or revising the article, gave final approval of the version to be published, and agree to be accountable for all aspects of the work.

Availability of Data and Material

Since this is a funded work, the raw data is property of Mekelle University. Data request can be arranged by the investigators for a reasonable formal request.

Ethics Approval and Consent to Participate

Ethical clearance was found from the ethical review committee of College of Health Sciences, Mekelle University. Written informed consent was obtained from each of the study participants after being informed in detail about the objective, purpose, benefit, risk, and the confidentiality of information and the voluntary nature of participation. In addition, participants who had musculoskeletal pains during the data collection time were advised and referred, for further care to physiotherapists at Mekelle University Ayder Referral hospital.

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