**Stress Classification of Medical Practitioners Using Machine Learning Techniques**

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***Abstract*- Stress is a feeling of tension. In whichever field is working most of them undergo the work pressure. At this time the most stressed people are medical practitioners. The doctors, nurses, and other health care members are trying their maximum to save one's lives. COVID-19 allows doctors to extend their working time on a daily basis. The paper aims to produce a comprehensive study of the physical and mental health status of them from the previous year to till this pandemic situation. The death rate, recovery rate, and the number of diagnosed patients are the parameters to identify the stress level among them. The research has analyzed various practitioners' mental problems due to their lifestyles and corporate culture in multispeciality hospitals and individual targets in some states of India. Especially due to Covid-19, all the doctors in the global level, tremendous variations bring out the larger affected population. The aim of the research is to evaluate which machine learning techniques will work efficiently to classify the various stress levels of doctors.**

**Keywords:Machine Learning Techniques, Medical Practitioners, Stress Classification**

# I. INTRODUCTION

Stress is a widespread phenomenon that has been prevalent since the beginning of human existence. Stress has been an important part of life and is needed up to a certain extent to be able to function normally. In terms of physics, stress is simply a prolonged subject to strain that an object undergoes. Low levels of stress might be desired, useful, and even healthy. Stress, in its positive form, can improve biopsychosocial health and facilitate performance [1]. However, high levels of stress are harmful to the human body and could cause serious health issues. Work stress has been prevalent with the rise in corporate lifestyle. Consequences of work stress can be categorized as Cognitive Consequences, Behavioral Consequences, Emotional Consequences and Physical consequences [2].

Stress in doctors can be caused by numerous factors ranging from excessive workload and extended work hours to complicated cases and demanding superiors, in addition to a family life that has to be attended to as well [3]. The emotions doctors feel while caring for seriously ill patients affect both the doctors’ practices and their well-being, especially if they fail to examine these feelings. Doctors appear at particularly high risk, as evidenced both by a burnout rate that may be as high as 40% and alarming consequences in both their personal lives such as suicidal ideation, depression, alcohol consumption, and divorce and professional behavior errors, malpractice, disruptive behavior, early retirement. When we look in to the today’s world health status of doctors, we can see that their stress rate has increased due to the Covid 19 in worldwide. They are not in a position to take good decision towards the patients’ health care, whom should be treated first or how to control the spreading virus. Without the essential equipment they are forced to work in this pandemic situation without any benefits to their mental ability. Day by day their stress level arises, so there is no need of any surprise that their mental health is in risk.

Machine learning algorithms could help determine key behavioral biomarkers to aid mental health professionals in deciding if a patient is at risk of developing a particular mental health disorder. Additionally, the algorithms may assist in tracking effectiveness of a treatment plan. Recent advancement in sensor data collection in clinical sciences led to a complex, heterogeneous data processing, and analysis for patient diagnosis and prognosis. Diagnosis and treatment of patients based on manual analysis of these sensor data are difficult and time consuming. Therefore, development of knowledge-based system to support clinicians in decision-making is important

[4].

II. LITERATURE REVIEW

Reshma Radheshamjee et. al., has proposed detection and analysis of stress using machine learning techniques. The main aim proposed by the researchers was to detect the stress using the information from the social media networking sites, like twitter. Using the twitter dataset the researchers present a method to detect expressions of stress and relaxation on twitter dataset that is about to capture the emotions or feelings about daily life. Here, TensiStrength framework is used to detect the strength of stress and relaxation expressed in social media text messages. The framework used lexical approach to detect direct and indirect expressions. Further investigation was done for the physician’s condition who worked for longer period and are not claiming their compensation. This is mostly seen in women doctors who are forced to do work in a corporate sector, meanwhile, its noticed that the male doctors claimed their compensation. The researchers conducted a survey among a group of doctors to analyze their health conditions. They studied the drugs the doctors used to get rid of their fatigue. The method proposed was the questionnaire and they further examined the crowd in a categorized manner. Most of the women doctors were known to be having symptoms of depression. The study indicated the management Occupational Stress was needed as a countermeasure against depression among doctors [5].

Reidar Tyssen surveyed about health problems and use of the health services among doctors. The study was based on Norwegian doctors. The review suggested that most of the physician’s health condition was similar to the general population. The doctors tried to go for self-treatment even if they weren’t aware of the situation, which lead to many problems. Most of the physicians in the country were diagnosed with the mental disorders. The result showed that while physician’s physical health appeared to be good, several studies reveal a high prevalence of stress – related and mental disorders, particularly depression and suicide. The misuse of medicines was also a problem in this professional group. Doctors often showed inadequate illness-related behavior, but specially organized treatment programmers for doctors was conducted almost all the countries. It showed a major difference which meant the treatment was working. The researches came to the conclusion that both men and women doctors were undergoing workload stress and it affected them badly [6].

Senada Selmanovic1 et.al., has identified specific risk factors for physician in UCC Tuzla. The presence of inappropriate expectations by patients and their families, work overload, poor communication with supervisors, work in shifts, inadequate or lack of continuous education, expose hospital doctors to continuous stress. Everyday stress can lead to mental, psychological and physical exhaustion, and professional burnout. They are often added to the enumerated other factors, such as lack of support from colleagues, the introduction of new technology, little opportunity for promotion, administrative work and time pressure for completion of tasks [7].

Martina Stamm et.al., investigated the perceived job stress, the working hours, and its impact on young doctors’ self – reported health and their satisfaction with life during residency. For the investigation, they used the data from various hospitals, it contains the details of the doctors and their mental and physical health status. All instruments are self – assessment scales, Cronbach’s alpha values are given for the study. The statistical analysis depict that the sample is divided into 4 groups based on the ratio between effort and reward scores. Above 80% percentage of the doctors had both measurements. And the reports revel that high work stress at both measurements. The study confirmed the hypothesis that the number of working hours is related to the perceived work stress caused by an imbalance between effort and reward [8].

Stewart Babbott et.al., proposed electronic medical records and the doctors stress in health care. The researchers assessed surgeon-reported stress, burnout, satisfaction, and intent to leave the practice, and predictors including time pressure during visits. The authors did so by using a two -level regression model to estimate the mean response for each surgeon cluster to each outcome, adjusted for doctors age, sex, specialty work hours and years using the EMR(Electronic Medical Records). They also conducted the survey evaluated organizational culture using five scales: practice emphasis on information/communication, trust in the organization, practice cohesiveness, and the surgeon -leader values alignment [9].

Rahul Amte et.al., did a survey on the stress level of critical care doctors in India. The main objective was to describe the demographic characteristics of critical care doctors in India. They then proceeded to assess the workload borne and to evaluate stress levels and factors influencing the doctors. A questionnaire based cross sectional study was conducted to depict the prevalence of stress levels and the associated risk factors. The survey concluded that most of the female doctors were mostly affected by stress and depression. It was due to the workload and extreme work hours without any compensation being provided. They were asked to work for extra hours and not waived off next day [10].

Rebekah L Gardner et.al., studied the doctors stress and the burnout through the impact of health information technology. The study was about how stress related to HIT use predicts burnout among doctors. Conducting a survey of all doctors in one state was done to determine the prevalence of burnout symptoms and HIT- related stress across the entire sample and among the most common respondent specialties. Among HER, users reported HIT related stress, with the highest prevalence in primary care-oriented specialties. HIT related stress was measurable, common, specialty - related and independently predictive of burnout symptoms. Identified HIT -specific factors associated with burnout would guide healthcare organizations seeking to measure and remediate burnout among their doctors and staff [11].

Nareem Mansoor et.al., analyzed the level of stress among doctors in public and private hospitals of Pakistan. The authors proposed the study to find out the sources of stress among the doctors in both the sectors. The study was analyzed with the help of questionnaire section. The questionnaire was conducted on basis on the seven aspects i.e., workload, working condition, role overload, sleep deprivation and unrealistic demands of the patients. A statistical tool is used to measure the priorities that seven aspects falls. The first source of stress was identified with the sleep deprivation, second was workload, third was working condition, fourth was role overload and the last was the unrealistic demands of the patient.The questionnaire was conducted separately in public and private sectors. The authors showcased the comparative study on private and public that, in public sector the doctors are mostly affected with the stress than the private sector doctor’s [12].

Worawat Lawanont et.al., proposed a system that is related to IOT architecture to analyze stress level among the people in their daily life. The proposed system included an activity tracker as a sensing device, it could be also used to sense the heart rate. The aim was to study the overall stress level using the perception survey as an evaluation method for the model. To examine the data, it is collected from 10 people, where 6 were males and 4 of them were females aged between 20 -26 years. These people worked between 6- 10 hours per day. These people were asked to wear the activity tracker when they went to sleep and for the whole day during the next day as well. The data was collected from the people on their working day. The data was collected in terms of five categories, that is the number of steps, calories, sleep cycle, heart rate, and resting heart rate. Some statistical analysis had been done based on these five categories of data from 10 people in 10 days. The study contributed to shows the possibility of using daily electronic devices to encourage an individual to have better well-being [13].

The study was on job satisfaction among doctors in a tertiary hospital in Delhi and the various factors related with it. The authentic data was collected with the help of questionnaire and the statistical methods used were proportions and chi-square tests. The different variables include Gender, Marital status, Workhours/day, Night-shifts/month, adverse event in family during the year. The end result was that a significant proportion of doctors were found to be dissatisfied with the average number of their workhours and salary. Factors like the average number of workhours per day and the number of night shifts per month were found to have a significant relation with dissatisfaction [14].

III .METHODOLOGY

To analyze the stress level among the doctors, the most methods used to classify the resources and the results were taken based on the questionnaire and the surveys conducted by most of the researchers. The most commonly used method to analyze the stress level among the doctors was the questionnaire method. With the help of these questionnaire method some of the resources were identified and also the gender of the population that were mostly affected with respect to their work stress and as well as their family issues were also identified. In such cases, it would affect their mental strength and they may lose their control over the patients too and not be dedicated to work as well. Questionnaire was prepared and evaluated by the Centre for Epidemiologic Studies Depression scale, the scale has been widely used to measure symptoms of depression in the general population and it was analyzed using multiple logistic regression. Survey administration was done to measure health information, patient care, and job satisfaction with help of the survey questions. Demographic and practice variables include the age, gender, ethnicity, socioeconomic measures practice settings, practice size etc.., Burnout variables- Burnout was measured using a single question item, it identifies their symptoms of burnout, related stress variables. Statistical Analysis like chi- square test is used in bivariable variables, multivariable logistic regression is used to measure the association between the burnout and each measure of HIT related stress. Sample and Sampling techniques - from 240 doctors, each 120 from public and private hospitals were selected as sample through simple random sampling technique. Pilot testing- Validation and authentication of research tool.

Data Collected and analysis - it was organized, tabulated, analyzed and interpreted. The statistical tools i.e., mean, standard deviation and t-test were used for the statistical analysis of the data. SPSS (Version 16) was used to calculate mean, standard deviation and t-value.

IV. CONCLUSION

All sort of stress is injuries to health. The sources of stress can be found from the home to their working space. Even though the source differs the actual impact on the people still remains the same as destroying their mental strength, this promotes the personal imbalance on themselves. Nowadays we could see how the doctors are facing day today’s situation due to Covid 19.There are numerous doctors and nurses to stay along with the patients with all the precautions, these people undergoes the certain stress levels, some may be easy to handle but some may have reached to the extreme level. The occupational stress they are handling now is speechless, the effort they are taking to provide the best treatment to each one of them sometimes affect the doctors or nurses life. It is important to manage a systematic operation to take care of them. We have seen that some frameworks were introduced to detect and analyze the stress among the doctors. We are in a stage to protect the health service members, those who have treated us in our illness. The identification of stress in one is not simple to detect as well as to analyze it. With Machine Learning technique we could find out simple method to overcome being stressed.

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