MEDICAL SCIENCE

The effect of psychological stress on physical and behavioral health and its role in chronic diseases in Saudi Arabia

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ABSTRACT

Background: Psychological stress is a phenomenon caused by the relationship of a human with its environment. Stress can lead to depressive disorders. According to World Health Organization, one out of four human beings is stressed nowadays. *Objectives:* To find the percentage of the middle-aged population suffering from psychological stress and to find if psychological stress affects the middle-aged population's physical and behavioural health and chronic diseases. *Methodology:* A cross-sectional study was designed and data was collected from Saudi natives of age 40 years and above with the help of an online survey tool; the calculated sample was 385 individuals, whereas an extra 10% was taken to increase the validity of the study. *Results:* Study participants were from fourteen different cities in Saudi Arabia. There were 48.9% of males and 51.1% of females and 64.8% of them had a university level of Education. Of the participants, 131 (31%) scored to have low psychological stress, 247 (58.4%) had moderate stress and 45 (10.6%) scored to have high perceived psychological stress. Psychological stress was found to be significantly associated with Headaches, digestive problems, chest pain, muscular stiffness and sexual problems ($p<0.001$). Psychological stress was found to be significantly associated with behavioural irritability, Smoking, lack of sleep, lack or excess of eating and avoiding gatherings ($P<0.001$); psychological stress was not associated with Chronic diseases ($p>0.001$). *Conclusion:* Most Saudi adults aged 40 years and above have moderate psychological stress (58.4%). Psychological stress can significantly affect an adult's physical and behavioural health.

Keywords: Psychological stress, Stress, Health, Depression, Physical Health

1. INTRODUCTION

Stress is multifactorial. It comes from many sides of life. One of the primary reasons that cause stress is that families cannot meet their current and ongoing financial obligations (Friedline et al., 2021). It has been seen that individuals who are exposed to stress in the early years of life are more prone to age-related chronic diseases. Their mortality rates are higher than those who grew up in a better economic environment. Individuals with stressed life are found to get vascular and autoimmune diseases resulting from activating pro-inflammatory mechanisms (Miller et al., 2011).

An external or internal cause of psychological stress is what Hooke called a load; other people refer to it as stress or a stressor. It is accompanied by an evaluation (by a mind or a physiological system) that distinguishes what is threatening or noxious from what is benign, with a complex pattern of effects on the mind and body, often referred to as the stress reaction. There have been two influential qualitative expansions of the stress concept. On the other hand, Eustress was a good sort of stress. It was related to pleasant feelings and healthy physiological states whereas distress was wrong because it was linked to bad sensations and unbalanced bodily states. Harm refers to the psychological damage already done, like an irreversible loss. The threat is of harm that has not yet occurred but may be imminent. Complex demands present challenges we can overcome by effectively mobilizing and utilizing our coping resources (Lazarus, 1993).

Though psychological stress seems a simple process and looks harmless, it has been widely studied to be the cause of many health issues. Studies indicate that continuous stress can lead to clinical depression and cardiovascular diseases. Stress weakens the human immune system, making an individual more susceptible to infections (Cohen et al., 2007). Psychological stress can imbalance many hormones that affect normal health conditions. In females of childbearing age, stress causes many womanly health issues. Persistent stress can affect the menstruation cycle as well as causes infertility cases. In a study, 22 women were interviewed before their first visit to infertility centers and an alarming 40% suffered from anxiety, depression and persistent stress (Rooney and Domar, 2018). Glucocorticoid levels are also increased in case of stress, which further impairs synaptic plasticity, cognitive and memory loss and causes ageing. Along with rapid ageing, stress-induced G levels also result in age-related disorders (Hasan et al., 2012).

According to the World Health Organization, about 25% of the world's population, either in developing countries or developed, face mental health issues. A research study was conducted in Saudi Arabia, where the data was collected from higher school students studying in four different country areas. Results showed that 48% of the students were having some stress issues and based on gender, 51% of the females were going through some mental issues (Almutairi, 2015).

According to the current statistics, the Saudi community has an increasing stress level (Shahab et al., 2017). This study targeted middle-aged Saudi people. It studied what percentage of the population suffers from psychiatric stress. The study aims to determine if anxiety has impacted the population's physical and behavioural life activities. Thirdly the study focused on chronic diseases. Stressed people are coping with and if there is any significant association between persistent stress and chronic diseases in the Saudi population or not.

Objectives

To find the percentage of the age 40 years and above population suffering from psychological stress
To find if psychological stress has any effects on the physical and behavioural health of aged 40 years and above population
To find if psychological stress has any significant association with chronic diseases in the age 40 years and above population

****Note**

The middle age ranges from 40 to 60 years, and the senior ages range from 60 and above (Mouodi et al., 2018)

2. METHODOLOGY

Study design

Current study followed cross-sectional study design (Abdulghani et al., 2011), as the data was collected from the subjects at one point of time by the help of survey questionnaire.

Study Setting

Study took place in Saudi Arabia.

Time period

Data was collected and analyzed for present study from July 2022 till February 2023.

Study Population/ Subjects

Both males and females living in Saudi Arabia were taken as the study population as per the inclusion and exclusion criteria (Table 1).

Table 1 Inclusion and exclusion criteria of study

Inclusion Criteria	Exclusion Criteria
The Arab Saudi residents of age 40 years and above	Residents younger than 40 years of age

Sample Size

Saudi Arabia's total residents are around twenty-one million six hundred ninety thousand six hundred forty-eight Saudi, out of which five million six hundred twenty-one thousand four hundred thirty-three individuals Saudi are of age 40 years and above (Sabbagh et al., 2021). For confidence interval of 95% the calculated sample size is 385 Saudi Arabs both males and females (Raosoft).

Sampling Technique

Simple random sampling technique was used in current research

Data Collection Methods, instruments used and Measurements

A questionnaire was made using online survey tool and it was shared with the subjects by the help of social media. In the questionnaire the psychological stress levels was measured by the help of Likert scale (Al-Rayes et al., 2022). Techniques used were briefly described and referenced. Study definitions (e.g., case definition) were mentioned as appropriate.

Data Management and Analysis Plan

Data was recorded on Excel and analysis was done by the help of SPSS. Demographic details were analyzed by descriptive analysis on SPSS, the association between psychological stress and health was measured by Pearson Chi square test (Abdulghani et al., 2011).

Ethical Considerations

Ethical approval for conducting the study was taken from Al-Rayan Research Ethics Committee (registered with the National Bioethics Committee in KACST Saudi Arabia). The study ID was HA-03-M-122-020 dated 12/1/2023. Verbally participants were informed with the details of research purpose before time and their consent was taken. Questions were asked and approval was taken in Arabic language. They were independent to decide if they wanted to fill the form. Personal data of participants was kept confidential.

3. RESULTS

Descriptive Analysis of data

Age Distribution of participants

A total sample of 423 participants was taken under study. The ages of participants were divided into three groups. As per the calculated data, 69.5% of the participants were aged 40-54 years, 27.9% were aged 55-69 years and 2.6% were older than 70 years. Frequencies and percentages of age distribution are summarized (Table 2).

Table 2 Age Distribution of Participants

Age of Participants		
Age group	Frequency	Percentage
40-54	294	69.5%
55-69	118	27.9%
>70	11	2.6%
Total	423	100%

Gender Distribution of Participants

In the current study, 48.9% of participants were male, whereas 51.1% of the participants were females. A summary of gender distribution is illustrated (Table 3).

Table 3 Gender distribution of participants

Gender distribution of samples		
Gender	Frequency	Percentage
Male	207	48.9%
Female	216	51.1%
Total	423	100%

Marital Status of Participants

In demographic data, the participants were also asked about their marital status and were given four options. Of the total 423 participants, 43 were unmarried, 304 were married, 49 were divorced and 27 were windowed. Data can be found (Table 4).

Table 4 Marital Status of participants

Marital Status of Participants		
Marital Status	Frequency	Percentage
Single	43	10.2%
Married	304	71.9%
Divorced	49	11.6%
Windowed	27	6.4%
Total	423	100%

Educational Levels of participants

Participants were further asked about level of education they had acquired. Out of the total, 23.6% had only acquired high school education, 11.6% had intermediate level and 64.8% had acquired university level education. Data is summarized (Table 5).

Table 5 Educational Background of Participants

Educational level of Participants		
Education	Frequency	Percentage
High School	100	23.6%
Intermediate level	49	11.6%
University	274	64.8%
Total	423	100%

Financial Status of participants

Further in personal details, participants were asked about their income status as to categorize their financial status. According to participant perspective 18.7% had low income, 64.8% had average income and 16.5% had high income status. Data is summarized (Table 6).

Table 6 Financial Status of Participants

Financial Status of Participants		
Income	Frequency	Percentage
Low	79	18.7%
Average	274	64.8%
High	70	16.5%
Total	423	100%

Residential status of participants

Data of current study was taken online, so the participants were from diverse background. Participants were from fourteen different cities of Saudi Arabia. 26.5% participants were from Al-Madinah, 23.6% were from Riyadh 14.9% was from Eastern, 11.1% were from Jeddah. Data is summarized (Table 7).

Table 7 Residential city of participants

Residence of Participants		
City of residence	Frequency	Percentage
Al- Jouf	20	4.7%
Al- Madinah	112	26.5%
Eastern	63	14.9%
Hail	7	1.7%
Jazan	7	1.7%
Jeddah	47	11.1%
Makkah	13	3.1%
Najran	5	1.2%
Qassim	13	3.1%
Riyadh	100	23.6%
Tabouk	14	3.3%
Yanbu	5	1.2%
Abha	11	2.6%
Al-Baha	6	1.4%
Total	423	100%

Regular Exercise

Further the participants were asked about their physical activity routine. It was asked if they do exercise regularly upon which 147 participants responded in yes and other 276 responded no. Data is summarized (Table 8).

Table 8 Exercise routine of participants

Regular Exercise		
Exercise	Frequency	Percentage
Yes	147	34.8%
No	276	65.2%
Total	423	100%

Chronic Diseases

Lastly in section one participant were asked if there is any chronic disease running in their family. 48% participants responded yes, 45.4% responded no and only 6.6% responded as they do not have any idea. Data is summarized (Table 9).

Table 9 Family history of Chronic Diseases if participants

Prevalence of Chronic Disease in family		
Chronic Disease	Frequency	Percentage
Yes	203	48%
No	192	45.4%
I do not know	28	6.6%
Total	423	100%

Psychological stress

In section II, there were a total of ten questions were asked and the score for each question was calculated as per the psychological scale. Based on the psychological scale, participant scores ranging from 0-13 were considered low stress, 14-26 were considered moderate stress and scores from 27-40 were considered high perceived stress. Out of the total samples, 30.97% were low-stressed, 58.39% were moderately stressed and 10.64% were highly stressed. Data are summarized (Table 10).

Table 10 Level of psychological stress of participants

Stress Level	Frequency	Percentage
Low Stress	131	31%
Moderate stress	247	58.4%
High perceived stress	45	10.6%

Physical Health

Further participants were asked five questions related to their physical health and the data was recorded as not at all, a little, somewhat and much. Upon question of headache 19.1% had no headache, 35.5% said that they do suffer from a little headache, 29.8% had somewhat headache and 15.6% had much headache. As per Chest problem 30.7% narrated not at all, whereas 29.1% had a little pain, 27.2% had somewhat pain and 13% narrated to have much chest problem. When participants were asked about digestive problems 24.8% had no issues, 30% had little, 26.5% had somewhat and 18.7% had much digestive health issue. Participants were asked about their sexual health 54.1% had no issues, 20.3% had a little, 16.5% had somewhat and only 9% said to have much sexual health issues. Lastly when asked about muscular problems 29.8% responded not at all, 26.5% had a little, 30.5% had somewhat and 13.2% had much muscular problems. Data is summarized (Table 11).

Table 11 Physical Health problems faced by participants

Physical Health					
Physical Health	Not at all	A little	Somewhat	Much	Total
Headache	81 (19.1%)	150 (35.5%)	126 (29.8%)	66 (15.6%)	423 (100%)
Chest Pain	130(30.7%)	123 (29.1%)	115 (27.2%)	55 (13%)	423 (100%)
Digestive Health	105(24.8%)	127 (30%)	112 (26.5%)	79 (18.7%)	423 (100%)
Sexual problems	229(54.1%)	86 (20.3%)	70 (16.5%)	38 (9%)	423 (100%)
Muscular Problems	126 (29.8%)	112 (26.5%)	129 (30.5%)	56 (13.2%)	423 (100%)

Behavioral Health of Participants

In next section, participants were asked six questions related to their behavioral health and the responses were recorded as not at all, a little, somewhat and much. Upon question of irritability 25.8% had no irritability, 34.5% said that they do suffer from a little irritability, 23.4% had somewhat and 16.3% had much irritable behavior. As per lack of sleep 16.5% narrated not at all, whereas 30.3% had a little, 29.3% had somewhat and 23.9% narrated to have much issue with sleep. When participants were asked about lack or excess of eating 22% had no issues, 31.4% had little, 27.9% had somewhat and 18.7% had much eating problems. Participants were asked about their social life as if they avoid gatherings 25.8% had no issues, 34.5% had a little, 23.4% had somewhat and only 16.3% said to have much issue in socializing. Lastly when asked about smoking habits 58.9% responded not at all, 18.9% had a little, 7.8% had somewhat and 14.4% had much habit of smog. Data is summarized (Table 12).

Table 12 Behavioral Health problems faced by participants

Behavioral Health					
Behavioral Health	Not at all	A little	Somewhat	Much	Total
Irritability	109 (25.8%)	146 (34.5%)	99 (23.4%)	69 (16.3%)	423 (100%)
Lack of sleep	70 (16.5%)	128 (30.3%)	124 (29.3%)	101 (23.9%)	423 (100%)
Lack or excessive eating	93 (22%)	133 (31.4%)	118 (27.9%)	79 (18.7%)	423 (100%)
Avoiding Gathering	109 (25.8%)	146 (34.5%)	99 (23.4%)	69 (16.3%)	423 (100%)
Smoking	249 (58.9%)	80 (18.9%)	33 (7.8%)	61 (14.4%)	423 (100%)

Depression Score

Lastly in questionnaire nine questions were asked from the participants to perceive their level of depression. The responses of questions were collected by four options not at all (scored 0), a little (scored 1), somewhat (scored 2) and Much (scored 4). Total of nine answers was summed up if the sum was 0 it means there is no depression, 1-4 result indicated very mild or no symptoms, 5-9 result indicated the presence of mild depressive symptoms, 10-14 result indicated moderate depressive symptoms, 15-19 result indicates the presence of depressive symptoms of moderate severity, 20-27 indicated the presence of severe depressive symptoms. The responses gathered are summarized (Table 13).

Table 13 Level of Depression in participants

Level of Depression in participants		
Level of Depression	Frequency	Percentage
No depression	35	8.3%
Very Mild Depression	49	11.6%
Presence of mild depression	96	22.7%
Moderate depression	120	28.4%
Symptoms of moderate severity	78	18.4%
Severe Depression	45	10.6%
Total	423	100%

Relationship between Psychological Stress and Physical Health

To evaluate the relation between psychological stress and physical health chi square test was used and in case of chest pain, digestive problems, sexual problems and muscular stiffness a significant association was found between both factors as the value of $p<0.05$. The results are summarized (Table 14) (Figure 1).

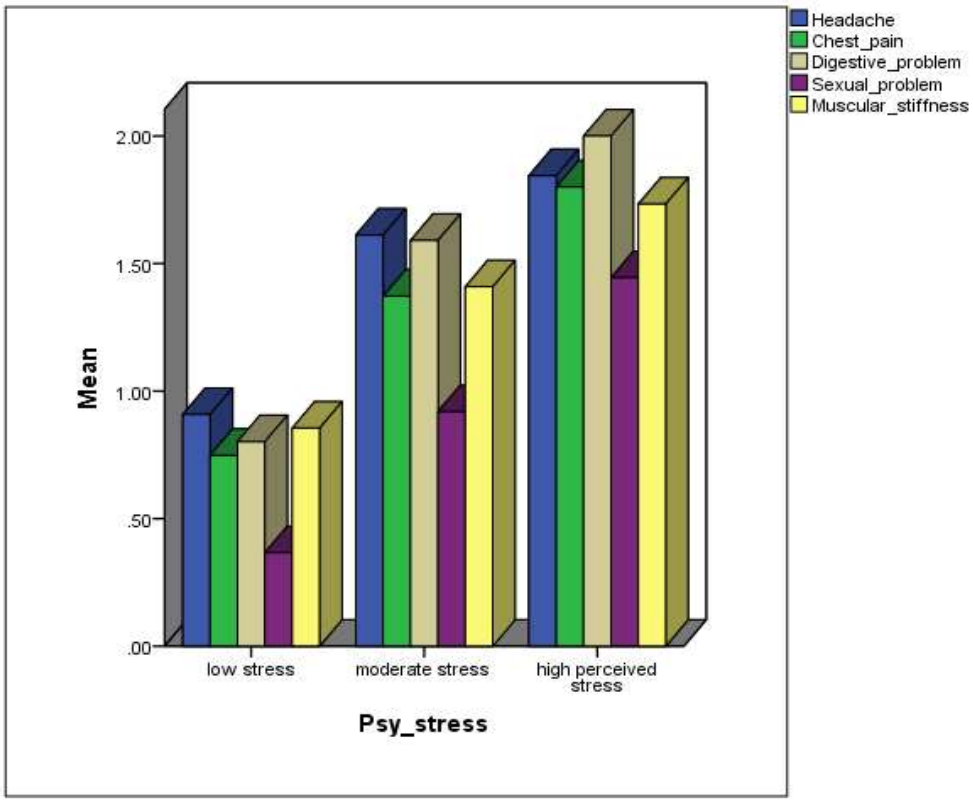

Figure 1 Prevalence of physical Health problems in relation with psychological stress

Table 14 Chi Square values of relation between psychological stress and Physical Health

Relationship between psychological stress and physical Health		
Physical Health	X^2	p-value
Headache	72.0	0.000
Chest pain	50.9	0.000
Digestive Problem	73.9	0.000
Sexual Problem	56.7	0.000
Muscular Stiffness	46.0	0.000

Relationship between Psychological stress and Behavioral Health

The relation between psychological stress and behavioral health was evaluated by chi square test and in case of irritability, lack of sleep, lack or excess of eating, avoidance of gathering and smoking a significant association was found with psychological stress as the value of $p<0.05$. The results are summarized (Table 15) (Figure 2).

Table 15 Chi Square values of relation between psychological stress and behavioral Health

Relationship between psychological stress and behavioural Health		
Behavioural Health	X^2	p-value
Irritability	55.08	0.000
Lack of sleep	75.6	0.000
Lack or excess of eating	79.53	0.000
Avoidance of gathering	82.7	0.000
Smoking	16.86	0.01

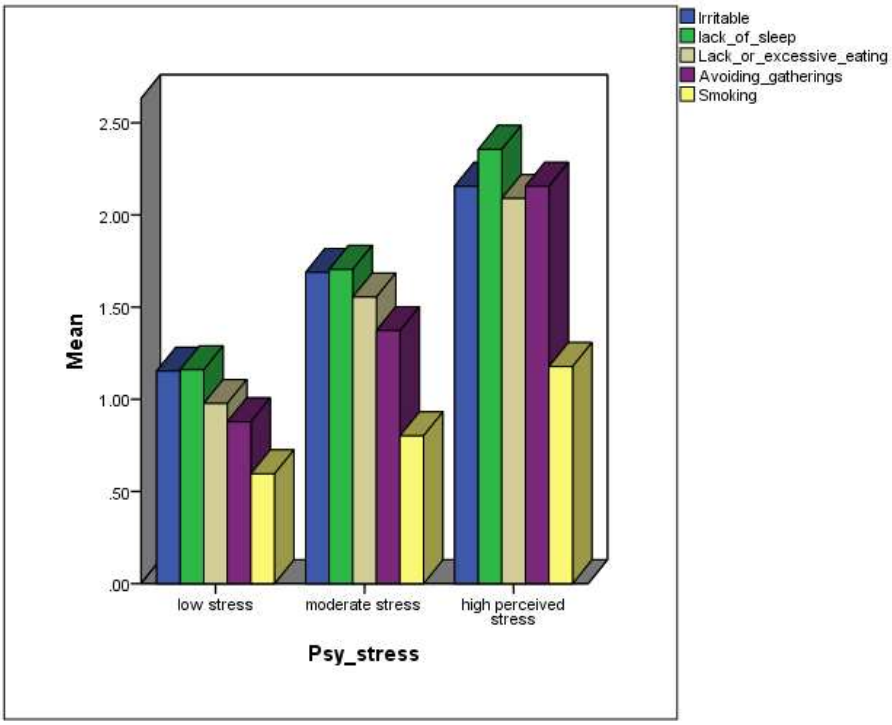

Figure 2 Prevalence of Behavioral Health issues in relation with psychological stress

Relationship between Psychological Stress and chronic disease

To find the relation between chronic disease and psychological stress the chi square test was applied and it was seen that the Depression was association with psychological stress $p<0.05$ but blood pressure and diabetes were not found significantly associated $p>0.05$. Data is summarized (Table 16) (Figure 3).

Table 16 Chi Square values of relation between psychological stress and Chronic Diseases

Relationship between psychological stress and Chronic Diseases		
Chronic Diseases	X^2	p-value
Depression	174.89	0.000
Blood Pressure	4.255	0.373
Diabetes	8.02	0.09

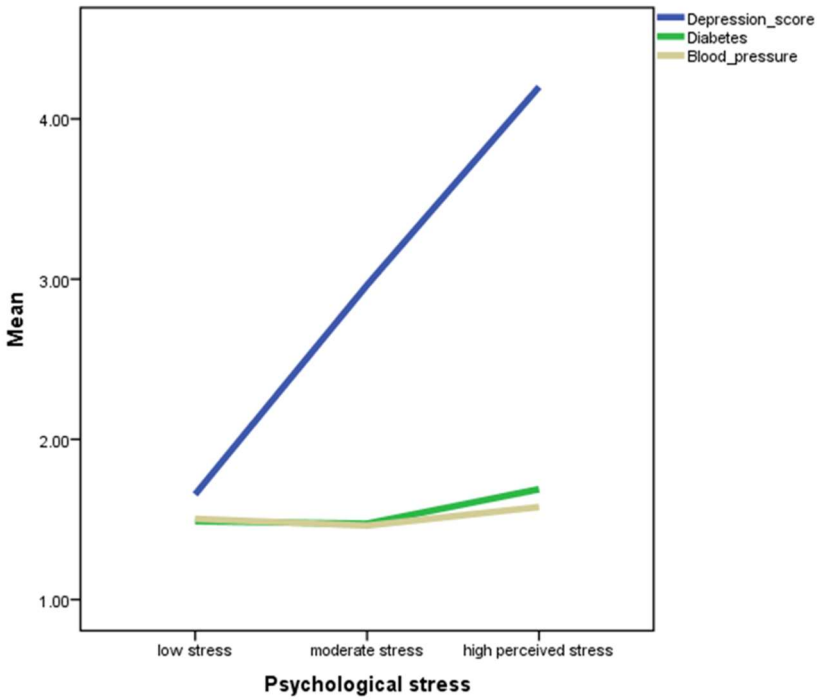

Figure 3 Relationship between Psychological stress and Chronic Diseases

4. DISCUSSION

The present research was a cross-sectional study designed to find the impact of psychological stress on physical and mental health. Participants of the study were from fourteen different cities of Saudi Arabia. There were 48.9% of males and 51.1% of females and 64.8% of them had a university level of Education. A similar study was conducted on medical students of Saudi Arabia, where the severe psychological stress was found in 25% of the population (Abdulghani et al., 2011). In current study participants, 131 (31%) scored to have low psychological stress, 247 (58.4%) had moderate stress and 45 (10.6%) scored to have high perceived psychological stress. Psychological stress can be categorised as a predictor of health problems and many studies suggest that regular exercise can help to reduce stress. A study conducted on 147 adolescents revealed very positive impact of exercise on stress, whereas in current study there was no significant link found between psychological stress and regular exercise ($p>0.05$).

The physical Health of an individual is affected by several factors and that study believes that psychological stress can be one of the key elements. In physical health first headache had been associated with psychological stress. Psychological stress was found to be significantly associated with Headache. Many studies and reviews have been conducted on the relation of recurrent stress back findings research. According to one of the study the headache sufferers themselves believe stress as an aggravating factor to their problem (Schramm et al., 2015). Second measure in physical health was the digestive problems which also resulted in significant association with psychological stress. Out of 423 samples, about 74% of the participants were having digestive problems ranging

from a little to severe. Similar study was conducted on Mexico students where 56% of the samples were having digestive problems when studied with chronic stress (Pozos-Radillo et al., 2015). The study also found out a significant association of psychological stress with chest pain, muscular stiffness and sexual problems ($p<0.05$). Similarly, Lagraauw et al., (2015) has found the psychological stress as a predictor of cardiovascular diseases. Though in current study no association was found between psychological stress and Hypertension but cardiac problems have been highlighted.

In the second section of research psychological stress was studied as a factor affecting the behavioural health. Keeping the type of behavioural issues been highlighted by Ministry of Health KSA (Al-Rayes et al., 2022), psychological stress was found to be significantly associated with the behavioural irritability, lack of sleep, lack or excess of eating, smoking and avoiding gatherings ($P<0.05$). Studies have been conducted to find the impact of psychological stress on behaviour of individuals. In one of the study psychological stress was studied in chronic insomnia patients and it found a significant correlation between sleeping problems and psychological stress as found in current study. Participants of study defined stress as a precipitator of sleeplessness (Pozos-Radillo et al., 2015). Smokers frequently report smoking more in stressful situations and it has been argued that smoking is a coping mechanism for stress. Laboratory investigations have supported the conclusion that stress and smoking are causally related. However, it hasn't been proven that psychological stress consistently raises cigarette consumption (Pomerleau and Pomerleau, 1991).

Finally, in the current study psychological stress was linked to chronic diseases. It was significantly associated with Depression ($P<0.05$) but not with other Chronic diseases ($p>0.05$) such as hypertension and diabetes. Contrary to current study many studies found psychological stress as a factor involved in hypertension and cardiovascular diseases (Lombard, 2010). At the same time, a chronic disorder is correlated with psychological stress in many studies. Stress is considered as a milestone in causing MDD. Many studies have even evaluated the HPA axis pathway as cause of depressive disorders (Yang et al., 2015).

5. CONCLUSION AND RECOMMENDATIONS

A cross-sectional study was conducted on 423 Saudi participants aged 40 years and above. The study found out that majority of Saudi adults aged 40 years and above have moderate psychological stress (58.4%). Further the study concluded that psychological stress can significantly affect an adult's physical and behavioral health. As per the current study, psychological stress is not associated with hypertension and diabetes but it has significant association with Depression.

It is recommended to further design a longitudinal study on such a topic where the participants and their behaviors over time can be studied in relation to psychological stress. There is an increase in the onset of psychological stress so casual studies should be conducted to find the main cause of psychological stress. Eliminating societal stress triggers can help form a mentally and physically healthy community.

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Author Contributions

Dr. Jehad Nashi Alawfi was the principle investigator. Dr. Roaa Y. Hassan supervised the research proceedings at every step and helped to get approval from ethical board. The work was distributed among researchers so that everyone contributed equally. All the researchers helped in collectiong, compiling and analyzing data. Then further the documentation of research paper was also distributed among all researchers.

Ethical approval

This study was approved by Al-Rayan Research Ethics Committee (registered with the National Bioethics Committee in KACST Saudi Arabia). The study ID was HA-03-M-122-020 dated 12/1/2023.

Informed consent

Virtual informed consent was obtained from all individual participants included in the study.

Funding

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Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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