DOI: 10.7860/JCDR/2022/56794.16418

Original Article

Physiotherapy Section

Correlation between Perceived Stress, Physical Fitness and Health Related Quality of Life in Young Adults

TARUNJIT KAUR[1], SHAGUN AGARWAL[2]

BY-NC-ND

ABSTRACT

Introduction: A majority of population all around the world battles with psychological conditions such as anxiety, stress and depression. Its effects on disease and certain health conditions is almost well known but what effect does it have on an individual free from disease is yet to be found.

Aim: To establish a relationship between perceived stress levels, physical fitness and health related quality of life in young adults.

Materials and Methods: This cross-sectional study was conducted in Department of Physiotherapy at Institute of Applied Medicine and Research, Ghaziabad, Uttar Pradesh, India, from April 2020 to January 2021. A total of 120 subjects participated and were evaluated for perceived stress using Perceived Stress Scale (PSS), strength, endurance and flexibility were screened with help of dynamic sit up test, plank test and trunk lift test. World Health Organisation Quality of Life Instrument (WHOQOL- BREF) was used to measure the Health Related Quality Of Life (WHOQOL- BREF) domains and the statistical test used was Pearson's correlation coefficient.

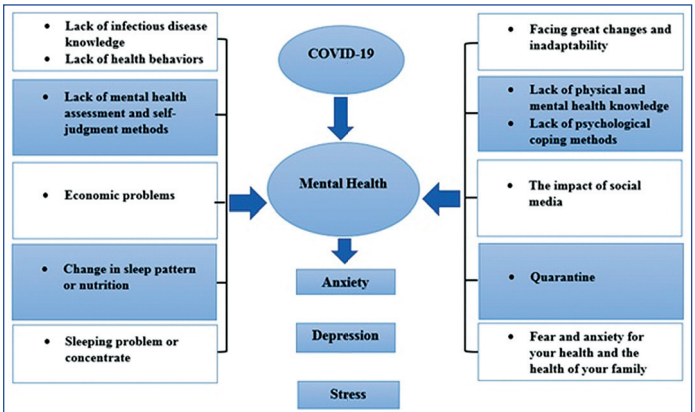
Results: The mean age of subjects was 20.82 years out of which 64 were females and 42 were males. Significant negative correlation (r-value=-0.819) was observed between perceived stress and endurance, negative correlation of significant nature (r-value=-0.805) was present between perceived stress and strength, a non significant, weak positive correlation at (r-value=0.105) was seen between perceived stress and flexibility. Consistent significant negative correlation was seen (r-value=-0.386, -0.423, -0.203, -0.124) between perceived stress and HRQOL.

Conclusion: High perceived stress has a negative effect on physical fitness and HRQOL in young adults.

Keywords: Endurance, Flexibility, Standard of living, Strength, Stress

INTRODUCTION

The world has faced numerous challenges during its duel with the pandemic Coronavirus Disease 2019 (COVID-19). The crisis were a broad spectrum of health, finance, political, ethical as well as concerned with management. Some of the main elements that were brought to light during this time were mental health, physical fitness and the quality of life that were majorly impacted by the catastrophe. One such factor that came into view during this time was stress, anxiety and depression [1] [Table/Fig-1].



[Table/Fig-1]: COVID-19 pandemic and mental health [1].

The prevalence of stress, anxiety and depression among the young adults in India is ranged from 5-70%, among which 18.5% had depressive symptoms, 24.4% suffered from the symptoms of anxiety and stress was observed in 20% of the population [2].

Previous study has shown that these psychological factors affect the humans adversely ranging from physical condition to mental well being [3]. It is proved that chronic stress affects the autonomic nervous system and weakens the immune response, whereas people who have perceived stress are susceptible to common cold, diabetes, asthma, cardiovascular disease and rheumatoid arthritis [4]. Higher perceived stress levels in lives of children have been linked to increased occurrence of metabolic disorders [5]. Stress has also been linked to its effect on wound healing as a study done on dental students showed that the participants healed from a mucosal punch biopsy wound 40% slower during the times of examinations as compared to when on vacation [6]. Exposure to acute and chronic stress has also been linked to having an effect on memory and learning functions [7]. In adults chronic stress is said to be associated with hormonal and inflammatory indicators of accelerated age [8].

Physical fitness and quality of life are key elements in an individual's life for proper functioning, any negative effect on those will lead to a poor living condition, morbidity and mortality [9]. Thus this study aimed to identify the role that perceived stress plays on physical fitness and health related quality of life of otherwise healthy individuals.

Null hypothesis: Increased perceived stress levels have no effect on strength, endurance, flexibility and Health Related Quality Of Life HRQOL of otherwise healthy individuals.

Alternate hypothesis: Increased perceived stress levels leads to decline in strength, endurance, flexibility and HRQOL of otherwise healthy individuals.

MATERIALS AND METHODS

This cross-sectional study was conducted in Department of Physiotherapy at Institute of Applied Medicine and Research, Ghaziabad, Uttar Pradesh, India, from April 2020 to January 2021. A total of 120 subjects participated. Ethical and Scientific clearance was obtained from IAMR, Ghaziabad, UP (Ref No. IAMR/22/3195) adherence to Helsinki Declaration of 1975 that was revised in 2013 was also followed. The sampling technique was Convenience Sampling. Instruments and tools used were a stop watch, yoga mat and tape measure.

Inclusion and Exclusion criteria: The subjects having age between 18-30 years, ambulant having a sedentary lifestyle with normal body mass index were included in the study. The subjects having any neuromuscular disorders, backache, recent spinal fracture/surgery/trauma, recent abdominal surgery/trauma, spinal deformities, cardiovascular conditions were excluded from the study.

Procedure

Scales and Questionnaires used in the study were:

Physical activity readiness questionnaire: It was endorsed by American College of Sports Medicine (ACSM) and is a self screening tool that can be used to safety or peril of exercises based on subjects health history, current symptoms, and risk factors. Hence serves as an excellent tool for pre exercise testing and prevents any injury that may result due to excessive or high intensity exercise [10].

Perceived stress scale: It is a self reporting psychological instrument used to measure the perception of stress. It is a tool that quantifies the extent to which circumstances in a person's life are considered as stressful. It consists of 10 questions to which the subject encircles the most relevant option from number 0-4. Scores are obtained by reversing responses and then summing across all scale items [11].

World Health Organisation Quality of Life (WHOQOL)- BREF: It is a field trial version of WHOQOL-100 developed by WHOQOL Group. This assesses the quality of life in 4 domains (Domain 1: Physical Health, Domain 2: Psychological, Domain 3: Social relationships, Domain 4: Environment). It consists of 26 questions and scoring is done by calculating raw scores by summing of items under each domain and then converting them into transformed scores by using the transformed scores table [12].

Procedure: All participants were informed about the research that data collected will be confidential and a consent from each of them was obtained. Demographic details of the subject were collected and evaluated for any exclusion criteria with PAR-Q.

Subject were then provided with the Perceived Stress Scale and WHO QOL- BREF and were asked to fill them according to the instructions provided.

To assess for physical fitness of the participants following tests are performed:

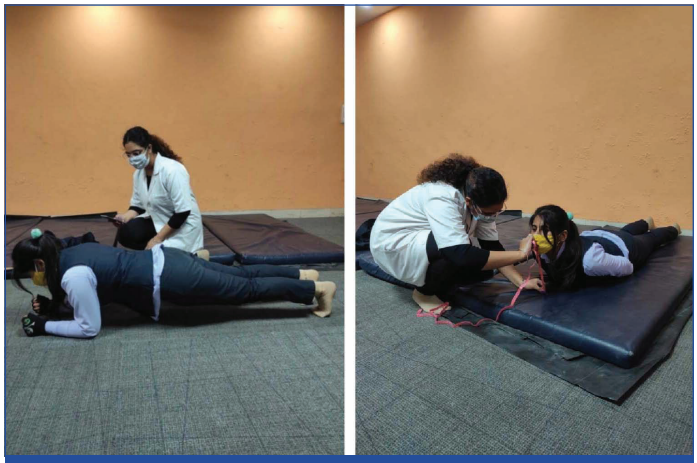
Dynamic sit-up test for strength: The test was conducted in three performance levels with increasing difficulty. This variation of the sit-up strength test is part of the ALPHA-Fit test protocol for adults [13].

Procedure: The subject lies in a crook lying position on the floor mat with their feet supported by holding them firmly to the ground. Five sit ups are performed by the subject each at three different levels. For the first five sit ups the subject tries to reach mid patella with the fingertips of both hands while keeping the arms straight and palms resting on thighs. For the second five sit ups, the arms are folded over chest, with the aim to reach the thighs with both elbows. For the last five sit ups, the subject touches the back of their earlobes with fingertips, and attempts to touch their thighs with their elbows. [Table/Fig-2-4]. The test score is the number of correctly performed sit ups i.e, a number between 0 and 15 [13].

[Table/Fig-2]: Sit up level 01. **[Table/Fig-3]:** Sit up level 02. **[Table/Fig-4]:** Sit up level 03. (Images from left to right)

Plank test for endurance: The subject support their upper body on their elbows and forearm whereas the lower body is in a straight line bearing the weight on their toes. The individual was asked to lift their hips off the ground. The stopwatch is started as soon as the individual attains the position and is held for as long as he can. The time is stopped when the individual is unable to hold the position anymore [Table/Fig-5] [14]. The time for which the position is held is recorded as the test score.

Trunk lift test for flexibility: Subject lies prone with the toes pointed back behind their body and hands placed under their thighs. Place a marker on the floor in line with the subjects eyes and instruct them to focus on the marker throughout the procedure. When ready the subject lifts their upper body from the ground in a steady and controlled manner and holds the position till measurement is taken from the tip of the chin to the floor. Once the measurement is complete the subject is instructed to return back to the normal position and the readings are recorded in inches [Table/Fig-6] [15].



[Table/Fig-5]: Plank test. **[Table/Fig-6]:** Trunk lift test. (Images from left to right)

STATISTICAL ANALYSIS

The IBM Statistical Package for Social Sciences (SPSS) software version 22.0 was used in the study for analysis of the data. Pearson's correlation coefficient was used to find the association between perceived stress and strength, perceives stress and endurance, perceived stress and flexibility, perceived stress and physical health domain of QOL, perceives stress and psychological domain of QOL, perceives stress and social relationships domain of QOL, perceived stress and environment domain of QOL. The p-value <0.01 was considered as statistically significant.

RESULTS

A total of 120 subjects participated in the study but only 106 were selected. The mean age was 20.82 years, out of which, 64 were females and 42 were males. A mean and standard deviation of 19.66 and 6.332 of perceived stress score was recorded for trunk lift scores with 42.16 sec being the mean and 22.037 sec standard deviation of the plank scores. The sit up score had an average of 10.33 and standard deviation 2.907 whereas 7.265 was the mean deviation and 2.6106 was the standard deviation recorded [Table/Fig-7].

The mean of physical health, psychological, social relationship and environmental domains scores of WHOQOL- BREF were 53.09, 59.88, 57.25, 58.26 with standard deviations being 13.478, 15.409, 20.160, 14.360.

Perceived stress and endurance: The correlation between perceived stress scores and plank held in seconds showed a significant negative correlation with r-value=-0.819 [Table/Fig-8].

Perceives stress and strength: The correlation between perceived stress scores and sit ups performed in numbers showed a significant negative correlation with r-value=-0.805 [Table/Fig-9].

Variables	Minimum	Maximum	Mean	Std. Deviation
Age (years)	17	28	20.82	2.341
Perceives stress scale	9	33	19.66	6.332
Plank (sec)	11	108	42.16	22.037
Sit ups	5	15	10.33	2.907
Trunk lift (inches)	3.0	17.0	7.265	2.6106
D1	25	100	53.09	13.478
D2	31	94	59.88	15.409
D3	0	100	57.25	20.160
D4	25	100	58.26	14.360

[Table/Fig-7]: Descriptive analysis (N=106).
D1=Physical health domain, D2=Psychological domain, D3=Social relationships domain, D4=Environment domain

Variables		PSS	Plank
Perceives stress scale	Pearson Correlation	1	-0.819**
	Sig. (2-tailed)	-	0.0001
	N	106	106
Plank	Pearson Correlation	-0.819**	1
	Sig. (2-tailed)	<0.001	-
	N	106	106

[Table/Fig-8]: Correlation between Perceives stress scale vs Plank.
The table shows r-value for correlation between perceived stress and endurance; PSS=Perceives stress scale, N=Number of subjects

Variables		PSS	Sit ups
Perceives stress scale	Pearson Correlation	1	-0.805**
	Sig. (2-tailed)	-	<0.0001
	N	106	106
Sit ups	Pearson Correlation	-0.805**	1
	Sig. (2-tailed)	<0.001	-
	N	106	106

[Table/Fig-9]: Correlation between Sit up v/s Perceives stress scale.

Perceived stress and flexibility: The relationship found between perceived stress and trunk lift values in inches presented a positive correlation although not very significant with r-value=0.105 [Table/Fig-10].

Variables		PSS	Trunk lift
Perceives stress scale	Pearson Correlation	1	0.105
	Sig. (2-tailed)	-	0.284
	N	106	106
Trunk lift	Pearson Correlation	0.105	1
	Sig. (2-tailed)	0.284	-
	N	106	106

[Table/Fig-10]: Correlation between Perceives Stress Scale (PSS) vs trunk lift test.

Perceives stress and health related quality of life: The physical health domain (D1) of QOL showed a significant negative correlation with perceived stress with r-value-0.386. Psychological domain of QOL (D2) also presented a significant negative correlation with perceived stress with r-value-0.423. The association of social relationships domain of QOL (D3) with perceived stress had a negative correlation at r-value=0.203 that was less significant than D1 and D2. Environmental domain of QOL (D4) had a negative correlation with perceived stress, although not very significant at r-value=0.124 [Table/Fig-11].

Variables		PSS	D1	D2	D3	D4
PSS	Pearson correlation	1	-0.386**	-0.423**	-0.203*	-0.124
	Sig. (2-tailed)	-	<0.0001	<0.0001	.037	.207
	N	106	106	106	106	106
D1	Pearson Correlation	-0.386**	1	0.635**	0.425**	0.523**
	Sig. (2-tailed)	<0.0001	-	<0.0001	<0.0001	<0.0001
	N	106	106	106	106	106
D2	Pearson Correlation	-0.423**	0.635**	1	0.363**	0.515**
	Sig. (2-tailed)	<0.0001	<0.0001	-	<0.0001	<0.0001
	N	106	106	106	106	106
D3	Pearson Correlation	-0.203*	0.425**	0.363**	1	0.389**
	Sig. (2-tailed)	0.037	<0.0001	<0.0001	-	<0.0001
	N	106	106	106	106	106
D4	Pearson Correlation	-0.124	0.523**	0.515**	0.389**	1
	Sig. (2-tailed)	0.207	<0.0001	<0.0001	<0.0001	-
	N	106	106	106	106	106

[Table/Fig-11]: Correlation between PSS and domains of health related quality of life.
PSS=Perceived stress scale, D1=Physical health, D2=Psychological health, D3=Social relationship, D4=Environment

DISCUSSION

The analysis addressed the correlation between perceived stress, physical fitness and health related quality of life in young adults. Physical fitness can be divided into two groups i.e, health related and skill related and in this study it was addressed in categories, namely strength, endurance and flexibility which are a part of health related fitness and play a major role in normal functioning of the body [16]. Dynamic sit up test, plank test and trunk lift test was used in the study to measure these components as they are excellent tools that provide us with quantitative values, are simple to perform and understood by the subject and are time saving.

The study demonstrated that perceived stress has a measurable impact on strength and endurance. Increase in perceived stress lead to decrease in strength and endurance. Consequently, little to no effect of perceived stress was seen on flexibility. Hence, this null hypothesis was rejected. A study by Li Q et al., has shown that stress hormone causes oxidative damage in skeletal muscle further impairing their quality and function [17]. The study supports the statement as significant decrease in muscle strength and endurance was observed as stress increases. Another study by Allen DL et al., has shown that daily psychological stress induces atrophic gene expression and loss of muscle mass [18]. An increase in muscle stiffness was also seen in stress sensitive women [4].

Research done in the past has proved that reduction in perceived stress levels causes lesser negative feelings of anxiety, depression and improves one's sense of well-being [12]. The statement is further supported by the results of this study as analysis verified a significant decrease in quality of life as there was an increase in perceived stress in individuals. The psychological domain of quality of life was the most affected by an increase in levels of perceived stress followed by physical health domain, social relationships and environment domain.

A study on Chinese adults by Qi M et al., showed significant correlations between HRQOL and perceived stress levels in individuals post the outbreak of COVID-19 which was also found in this study [19].

This study shows a strong negative correlation between perceived stress level, physical health domain and psychological domain of HRQOL which can further be validated by a study conducted by Seo EJ et al., that showed indirect effect of perceived stress on depressive symptoms and health promoting lifestyle behaviour [20]. Another study by Cao B et al., that indicated dislike towards physical activity in people with higher levels of perceived stress [21].

Østerås B et al., conducted a study on Norwegian adolescents to seek a correlation between physical fitness and stress levels and found that the stress factor lack of joy had a negative correlation with components of physical fitness which further validates the results of this study [22].

The result of the analysis clearly presents the inverse relationship between perceived stress, physical fitness components and 4 domains of quality of life with the exception of flexibility. Therefore, stress is not only responsible for affecting the psychological well being in individuals but also has an adverse effect on their physical fitness, social lives as well as their surroundings. It can also be stated that mere absence of disease does not make you physically fit and quality of your life high. An active initiative needs to be taken to assess people for perceived stress and provide solutions in order to maintain a fit physical, psychological and social state.

Limitation(s)

The sample size used in the study was small in order to represent the whole population.

CONCLUSION(S)

High perceived stress has a negative effect on physical fitness and HRQOL in young adults. Although flexibility had a positive correlation with percieved stress it remained non significant hence further research is required to establish any significant association between the two.

Acknowledgement

Special thanks to all the participants who participated in the process of data collection and fellow MPT Scholar Neha Goyal for supporting me throughout the research process.

REFERENCES

[1] Salari N, Hosseinian-Far A, Jalali R, Vaisi-Raygani A, Rasoulpoor S, Mohammadi M, et al. Prevalence of stress, anxiety, depression among the general population during the COVID-19 pandemic: A systematic review and meta-analysis. Globalization and health. Global Health. 2020;16(1):57.
[2] Sahoo S, Khess CR. Prevalence of depression, anxiety, and stress among young male adults in India: A dimensional and categorical diagnoses-based study. J Nerv Ment Dis. 2010;198(12):901-04. Doi: 10.1097/NMD.0b013e3181fe75dc.
[3] Kimura T, Tsuda Y, Uchida S, Eboshida A. Association of perceived stress and stiff neck/shoulder with health status: Multiple regression models by gender. Hiroshima J Med Sci. 2006;55(4):101-07.
[4] McEwen BS. Protective and damaging effects of stress mediators: Central role of the brain. Dialogues Clin Neurosci. 2006;8(4):367-81.
[5] Eisenmann JC. Secular trends in variables associated with the metabolic syndrome of North American children and adolescents: A review and synthesis. Am J Hum Biol. 2003;15:786-94.
[6] Marucha PT, Kiecolt-Glaser JK, Favagehi M. Mucosal wound healing is impaired by examination stress. Psychosom Med. 1998;60:362-65.
[7] Schwabe L, Joels M, Roozendaal B, Wolf OT, Oitzl MS. Stress effects on memory: An update and integration. Neurosci Biobehav Rev. 2012;36:1740-49. [PubMed: 21771612].
[8] Epel ES. Psychological and metabolic stress: A recipe for accelerated cellular aging? Hormones (Athens). 2009;8:07-22. [PubMed: 19269917].
[9] Blair SN, Brodney S. Effects of physical inactivity and obesity on morbidity and mortality: Current evidence and research issues. Med Sci Sports Exerc. 1999;31(11 Suppl):S646-62.
[10] Shephard RJ. PAR-Q, Canadian Home Fitness Test and exercise screening alternatives. Sports Med. 1988;5(3):185-95.
[11] Lee EH. Review of the psychometric evidence of the perceived stress scale. Asian Nursing Research. 2012;6(4):121-27.
[12] Whoqol Group. The World Health Organization quality of life assessment (WHOQOL): Position paper from the World Health Organization. Soc Sci Med. 1995;41(10):1403-09.
[13] Suni J, Husu P, Rinne M. Fitness for health: the ALPHA-FIT test battery for adults aged 18-69. Tester's Manual. Tampare, Finland: Published by European Union DS, and the UKK Institute for Health Promotion Research. 2009.
[14] Tong TK, Wu S, Nie J. Sport-specific endurance plank test for evaluation of global core muscle function. Phys Ther Sport. 2014;15(1):58-63.
[15] Jackson AW, Morrow Jr JR, Jensen RL, Jones NA, Schultes SS. Reliability of the Prudential FITNESSGRAM™ Trunk Lift Test in Young Adults. Res Q Exerc Sport. 1996;67(1):115-17.
[16] Kariyawasam A, Ariyasinghe A, Rajaratnam A, Subasinghe P. Comparative study on skill and health related physical fitness characteristics between national basketball and football players in Sri Lanka. BMC Res Notes. 2019;12(1):397. Doi: 10.1186/s13104-019-4434-6. PMID: 31300031; PMCID: PMC6624989.
[17] Li Q, Zhang M, Chen YJ, Wang YJ, Huang F, Liu J. Oxidative damage and HSP70 expression in masseter muscle induced by psychological stress in rats. Physiol Behav. 2011;104(3):365-72.
[18] Allen DL, McCall GE, Loh AS, Madden MC, Mehan RS. Acute daily psychological stress causes increased atrophic gene expression and myostatin-dependent muscle atrophy. American Journal of Physiology-Regulatory, Integrative and Comparative Physiology. 2010;299(3):R889-98.
[19] Qi M, Li P, Moyle W, Weeks B, Jones C. Physical activity, health-related quality of life, and stress among the Chinese adult population during the COVID-19 pandemic. Int J Environ Res Public Health. 2020;17(18):6494.
[20] Seo EJ, Ahn JA, Hayman LL, Kim CJ. The association between perceived stress and quality of life in university students: The parallel mediating role of depressive symptoms and health-promoting behaviors. Asian Nurs Res (Korean Soc Nurs Sci). 2018;12(3):190-96.
[21] Cao B, Ren Z, Mcintyre R, Teopiz KM, Gao X, Ding L. Are physical activities associated with perceived stress? The evidence from the China Health & Nutrition Survey. Front Public Health. 2021;9:697484.
[22] Østerås B, Sigmundsson H, Haga M. Physical fitness levels do not affect stress levels in a sample of Norwegian Adolescents. Front Psychol. 2017;8:2176.

PARTICULARS OF CONTRIBUTORS:
1. Masters Scholar, Department of Physiotherapy, Institute of Applied Medicines and Research, Ghaziabad, Uttar Pradesh, India.
2. Principal, Department of Physiotherapy, Institute of Applied Medicines and Research, Ghaziabad, Uttar Pradesh, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Dr. Shagun Agarwal,
House No- 9th Km Stone, NH-58, Delhi Meerut, NH 34, Duhai,
Ghaziabad-201206, Uttar Pradesh, India.
E-mail: shagun.aggarwal@iamr.ac.in

PLAGIARISM CHECKING METHODS: [Jain H et al.]
- Plagiarism X-checker: Apr 04, 2022
- Manual Googling: Apr 15, 2022
- iThenticate Software: Apr 18, 2022 (11%)

ETYMOLOGY: Author Origin

AUTHOR DECLARATION:
- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. Yes

Date of Submission: **Mar 31, 2022**
Date of Peer Review: **Apr 23, 2022**
Date of Acceptance: **May 03, 2022**
Date of Publishing: **Jun 01, 2022**