

Original Research Article

The effect of waist hip ratio on the various stress types in I year Indian medical students

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ABSTRACT

Background: A medical student faces tremendous academic and non-academic stress owing to the vast curriculum and inadequate time. The impact of stress results in detrimental mental and physical health which is assessed here using stress questionnaires and anthropometric parameters. Stress need not be only academic. Hence it becomes vital to identify and target the specific and common non-academic stressors to enable the students to have a stress-free learning environment. The objective of this study was to find the inter relationship between waist hip ratio (WHR) and various stressors the student is exposed to.

Methods: 97 I year medical students participated in this cross-sectional study and were administered the medical student stress questionnaire (MSSQ), a validated tool and the anthropometric measurements (waist and hip circumference, waist hip ratio, body mass index) were taken. The data was analyzed using SPSS version 22.

Results: The study showed a negative correlation of WHR with all the stress parameters of which inter personal relationship stress (IRS) and teaching learning related stress (TLRS) were significant.

Conclusions: Increasing the duration of I year MBBS course and helping learners acclimatize to the new study environment may help in reducing stress. Stress relaxation techniques, psychological counselling and strengthening the mentor- mentee programs along with exercise regimen may aid in the stress reduction process and facilitate physical health.

Keywords: IRS, Medical students, MSSQ, Stress, TLRS, WHR

INTRODUCTION

Medical students are under constant and significant academic pressure due to the vastness of the medical course. Medical curriculum is known to be one among the most stressful courses.¹ The secure environment of primary and secondary education is lost to the insecurities and demanding perfectionist standards of medical training. This transformation is particularly pronounced in I year of MBBS which marks the transition phase in the students' life. The over demanding and hectic schedule brings about the onset of stress in the students.

Contrary to the popular belief, stress need not be only academic in a professional setting. It can be of various types namely inter personal related stresses, social related stress and group activity related stress.² Medical students often perceive themselves as being more prone to stress compared to other students resulting in the deterioration of not just physical health but also affecting their learning abilities, academic performance and social relationships both within and outside the confines of their medical school thus leading to a worsening mental health.³

Stress is known to alter various physiological parameters like weight, blood pressure to name a few. A

physiological, endocrine and sympathetic imbalance can be the outcome of stress.⁴ One of the easiest and commonly used tools to assess this imbalance is anthropometric measurement. Anthropometry includes a host of measurable parameters like waist circumference, hip circumference, waist hip ratio, weight and height measurements, body mass index to name a few. Waist and hip circumference along with waist hip ratio are most valid of the measurements since they form an indirect measure of central obesity, while body mass index helps in assessing general adiposity.⁵ Studies have shown a complex and intricate relationship between stress and anthropometry. There is an individualized anthropometric response to stress demonstrable by an increase in weight in some and a reduction in others.⁶ The search is still on for the exact cause for this contradictory response.

The fact that the students will face academic stress during the course of their study is predictable and has been proven by many researchers and also in our institution.³⁻¹⁰ Our aim was not to focus on this known entity of stress. Instead, we chose to identify and isolate the other forms of stress which the students might face resulting in an exacerbation and worsening of the already existing academic related stress and academic performance. We believe that, if the other forms of stressors are eliminated, we could provide a holistic and healthy learning environment to our young learners. In this study, the anthropometric measurements especially waist- hip ratio was assessed in correlation with the various forms of stress encountered by the students.

METHODS

This cross-sectional study was done in a medical college in South India on 97 of the 100 consenting I year medical students during college hours after obtaining the institutional ethics clearance. A general questionnaire and medical students stress questionnaire was administered to the medical students. During the course of the same week, anthropometric measurements were taken from the students which included height, weight, waist circumference, hip circumference, waist hip ratio and body mass index. The data obtained was tabulated and analyzed using SPSS version 22.

Medical students stress questionnaire²

This is a validated tool consisting of 20 questions specifically administered to medical students is graded from 0-4 on a Likert scale with 0 being ‘no stress’ and 4 being ‘severely stress’. It assesses 6 different causes of stress. These various parameters can be potential stress generators in medical students. The various forms of stress were classified and defined as follows based on the MSSQ questionnaire:

- *Academic related stress (ARS)* - deals with stress related to course content, inability to cope with syllabus, exams and results.

- *Inter and intrapersonal related stress (IRS)* - results from conflicts resulting from adjustment issues with peers, college personnel and trainers.
- *Teaching and learning related stress (TLRS)* - occurs when the student is unable to follow the teaching methods used.
- *Social related stress (SRS)* - arises due to lack of time to fulfil social obligations.
- *Desire and drive related stress (DRS)* - is the outcome of family and society pressures to study medicine.
- *Group activity related stress (GARS)* - is the product of being unable to perform in a group and be a team player.

Anthropometric measurements

Waist circumference was measured at the approximate midpoint between the lower margin of the last palpable rib and the top of the iliac crest. Hip circumference was measured at the widest portion of the buttocks. Both measurements were taken using a stretch resistant tape that provides a constant 100g tension with close skin contact and without underlying skin compression. Waist hip ratio was calculated from the above parameters (Waist in cm)/ (Hip in cm). Weight was measured with minimal clothing using a digital weighing scale to the nearest of 0.1kg. Height was measured using a stadiometer to the nearest 0.1cm. Head was positioned in Frankfurt horizontal plane with heels together and toes apart. Head, shoulder blades, buttocks and heels were in contact with the back board. BMI was calculated with the formula weight in kg/ (height in m²).¹¹

RESULTS

In present study, out of 97 subjects 64 were girls and 33 were boys. All subjects were between the age group of 18-20 years. Table 1 shows the anthropometric characteristics in our subjects. 15 students were underweight (BMI <18.5), 28 were overweight as per Asian standards (BMI >23) while the rest were in the normal BMI range. Our population had lower values of waist hip ratio (0.77) in comparison to the WHO standards (0.85 - mean cutoff value of men and women).

Table1: Subject characteristics.

Variable (n=97)	Mean±SD
Age	19.26±0.10
Height (cm)	164.58±9.10
Weight (kg)	57.91±10.88
BMI	21.29±2.93
Waist circumference (cm)	71.69±7.81
Hip circumference(cm)	93.73±6.53
WHR	0.764±0.04

WHR- waist hip ratio, BMI- body mass index.

Table 2: Stress characteristics in I year medical students.

Stress factors	Median (Inter quartile range)
ARS	2.5 (2.05,3.00)
IRS	1.70 (0.73,2.39)
TLRS	1.41 (0.78,2.23)
SRS	1.31 (0.25, 2.13)
DRS	0.36 (0.36,1.11)
GARS	1.75 (1.23,2.32)

ARS- academic related stress; IRS- interpersonal related stress; TLRS- teaching and learning related stress SRS-social related stress; DRS- desire and drive related stress; GARS- group activity related stress.

In Table 2, the stress characteristics in the subjects were studied. It is obvious that ARS is the leading cause of stress (median= 2.5), while DRS (median= 0.36) ranks last.

Table 3 compares the waist hip ratio with the various stress factors in medical students. Mann Whitney U test showed statistically significant difference ($p < 0.01$) between waist hip ratio (< 0.77) and IRS. Spearman's correlation was done to analyze the association between anthropometric parameters with stress parameters as shown in table 4. It is observed that all the anthropometric parameters studied had a negative correlation with stress parameters. Waist hip ratio was significantly negatively correlated with IRS (-0.237) and TLRS (-0.199).

Table 3: WHR and stress factors in I year medical students.

Variable	ARS	IRS	TLRS	SRS	DRS	GARS
WHR < 0.77 (n=55)	2.6 (2.2,3.0)	2 (1.0,2.81)**	1.66 (0.6,2.41)	1.33 (0.0,2.3)	0.0 (0.0,1.13)	2.0 (1.0,2.33)
WHR > 0.77 (n=42)	2.4 (2.0,3.0)	1.5 (0.25,2.0)	1.33 (0.66,1.66)	1 (0.00,2.0)	0.5 (0,1)	1.66 (1.33,2.33)

Mann Whitney U tests. ** $p < 0.01$; ARS- academic related stress; IRS- interpersonal related stress; TLRS- teaching and learning related stress SRS-social related stress; DRS- desire and drive related stress; GARS- group activity related stress.

Table 4: Correlation between anthropometry and stress in I year medical students.

Variable	ARS	IRS	TLRS	SRS	DRS	GARS
WAIST	-0.050	-0.294**	-0.240*	-0.083	-0.059	-0.090
HIP	-0.071	-0.246*	-0.224*	-0.111	-0.103	-0.129
WHR	-0.036	-0.237*	-0.199*	-0.002	-0.036	-0.020
BMI	-0.027	-0.246*	-0.162	-0.042	-0.127	-0.109

Spearman's correlation, * $p < 0.05$; ** $p < 0.01$; ARS- academic related stress; IRS- interpersonal related stress; TLRS- teaching and learning related stress SRS-social related stress; DRS- desire and drive related stress; GARS- group activity related stress.

DISCUSSION

An alteration in the external or internal environment which challenges the coping mechanism of an individual is termed as stress.¹² Stress in excess leading to a homeostatic imbalance is distress. Distress is known to alter the anthropometric measurements in the person exposed to the stressors.¹³ The present study focuses on the effect of waist hip ratio on the various stress factors.

ARS is the leading cause of stress which deals with stress relating to examination, results and workload. Since the medical course is tough, the workload is expected to be higher and examinations are bound to be challenging since the outcome of such a rigorous training has to be a doctor having considerable efficiency. IRS deals with conflicts with self and with others. This is a true test of a persons' adaptability to his social environment in the transition phase of I MBBS and his relationship with his

peers and superiors.² The median of TLRS was 1.4 and not high in the list of causes leading to stress in the learners which implies that they are satisfied with the teaching and learning methods employed in our institution. SRS (median 1.3) encompasses problems related to not having enough time for social obligations probably due to a higher workload. Our students have insignificant amounts of DRS (median= 0.3) proving that they come from happy families which provide them with a secure environment in order to aid their process in becoming excellent doctors.² The second highest form of stress faced by our young doctors is that of GARS (median = 1.75). These students are unwilling to actively participate in group activities and are not forthcoming for public presentations. In the subsequent years of MBBS, presence of GARS may prove to be a major handicap since the doctor patient care depends upon team work and good communication skills.²

In present study, statistically significant difference ($p < 0.01$) between waist hip ratio and IRS was observed. The internal and external conflicts leading to the onset of stress is demonstrated by a higher IRS. We hypothesize that students are not given enough time to adapt to the transition phase from rote learning to self-directed learning leading to internal conflicts. Adjusting to a new environment which is considerably different from a school environment and exposure to new friends and teaching methods results in external conflicts and mal adaptation. The lack of time given to the students to acclimatize maybe due to the shortening of the I year curriculum from 18 to 12 months which could be the primary cause for the development of IRS. Restoration of the I MBBS course back to 18 months might minimize the occurrence of this particular stressor. Plenty of studies have been done to prove the negative effect of stress on BMI. But there remains a paucity of studies which look into the anthropometric parameters with specific aspects of stress particularly in medical students. Shet et al and Rizvi et al have studied perceived stress with BMI and stress in software professionals in different settings and in both the studies, there was a positive association of stress with BMI.^{13,14} Gajjala et al studied stress factors in medical students and found that lower BMI was positively associated with TLRS. This finding is similar to our study, except that our students face higher amounts of IRS with lower waist hip ratios.¹⁵

We found that all the anthropometric parameters studied had a negative correlation with stress parameters. Waist hip ratio was significantly negatively correlated with IRS (-0.237) and TLRS (-0.199). BMI is a parameter that has already been looked into by other researchers and hence this study concentrates only on the waist hip ratio (waist and hip circumferences mirror the finding of waist hip ratio). One of the theories proposed for the negative association between waist hip ratio and TLRS is that malnutrition may cause attention deficit and hence trouble in understanding the didactic lectures. This in turn may lead to acute stress during exams resulting in over activity of the sympathetic drive and weight loss thus triggering a vicious cycle.¹⁵ This theory maybe further extrapolated to explain the mechanisms causing higher IRS with lower waist- hip ratio with IRS. Under nourishment may cause impatience and intolerance in the subjects while dealing with peers which can be the origin of conflicts and the precursor of stress. The prevailing unhealthy environment in such a situation potentiates the onset of anxiety and sympathetic overdrive. One of the ways to alleviate these stressors would be to implement a curriculum change which allows time for the adaptation into the I MBBS course. In addition, it becomes important to identify the personalities which maybe more susceptible to these stressors.¹⁶ Serious implementation of mentor- mentee concept, psychological counseling, and an exercise regimen would greatly facilitate the identification and thereby containment of stress in students.

A larger study sample with gender distribution may give better results. In depth study of the same with hormonal assays and autonomic nervous system tests in a multi-centric population will add strength to the observation.

CONCLUSION

Stress is an inherent feature of medical curriculum. Identifying the various aspects of stress which may impair a students' mental and physical health and deteriorate his or her academic performance is of paramount importance. Academic stress will be a constant fixture in a students' life as long as he remains a learner, whereas the other forms of stress can be modulated and needs to be recognized and eliminated. The detrimental effect of distress can be seen in the anthropometric parameters and this forms an excellent, reliable and indirect tool to assess students' physical and mental status. This study shows a negative correlation between stress parameters and WHR.

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