



KNOWLEDGE AWARENESS AND PERCEPTION OF METABOLIC SYNDROME AND ITS DETERMINANTS AMONG STUDENTS OF NORTHERN BORDER UNIVERSITY IN ARAR SAUDI ARABIA

Pathology

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ABSTRACT

Background-Metabolic Syndrome is an emerging global threat ,that has a bearing on the development of many clinical diseases ,such as hypertension ,diabetes mellitus ,dyslipidemia and associated vascular disease, cancers which contribute to the health burden in community .The prevalence of the condition across the world has grown gradually over the last few decades to almost reach epidemic levels presently. There are several factors which predispose to metabolic syndrome .Screening for these risk factors can go a long way in early detection and prevention of metabolic syndrome .The significance of metabolic syndrome in the target group of university students lies in the fact that ,this group is vulnerable for risk factors of metabolic syndrome and also thus the condition can be detected earlier and there by controlled,by proper screening and educational counselling. **Materials and Methods-** Predetermined Validated Questionnaire is prepared which includes queries regarding knowledge awareness and perception of Metabolic Syndrome . The collected information are tested by statistical methods[chi square test] to determine significance of findings **Observations-** Total 100 responses were recieved The above responses were subjected to statistical analysis by Chi square test using SPSS 20 which showed a significant P value of < 0.05 for all three domains of Knowledge ,awareness and Perception of Metabolic Syndrome **Conclusion:** The study concludes that students information about Metabolic Syndrome is significant in terms of their understanding its risk factors ,complications and also their insight.

KEYWORDS

Metabolic Syndrome,Knowledge ,Awareness ,Perception,Risk factors,Complications.

INTRODUCTION –

Metabolic Syndrome is a silent clinico-pathological condition characterized by central obesity, insulin resistance hyperglycemia ,hypertension and dyslipidemia.It is associated with risk factors such as famililal diabetes and obesity ,socioeconomic status, lack of exercise, tobacco smoking ,adoption of western life style ,such as consumption of aerated drinks which is high in sodium ,along with fast food ,that is rich in saturated fat'.In view of significant prevalence of disease among the world population ,many public health measures have been introduced especially in developing countries where its incidence is rising steadily² .Preventive measures can range from proper health education of public ,following good practices such as taking healthy diet rich in fruits and vegetables ,avoiding stress ,anxiety ,performing exercise regularly can help in cessation of its onset³ .Various screening modalities have been developed to detect the condition at the earliest and can range from both questionnaire based and non questionnaire based [such as measurement of BMI,Waist to Hip ratio]⁴ With regards to age and sex ,post menopausal females are at increased risk of metabolic Syndrome as shown by various studies⁵ .Prevalence ranges from low to high depending on the age ,sex ,race and region[developed or developing] and also specifically if the study population is from urban or rural⁶ .In a study conducted in USA ,it was suggested that metabolic Syndrome should be detected at early university level by encouraging study questionnaires to know and improve students awareness and knowledge about metabolic Syndrome⁷.Study conducted from qatar revealed that 28% of the country population met the criteria for metabolic Syndrome with variable such as age is directly proportional ,whereas physical activity and education indirectly proportional to the onset of Condition⁸ .Self assessment screening methods have been devised in South Korea to detect risk of metabolic Syndrome in non obese people⁹ .In a recent study from India the authors observed the prevalence of the condition to be as high as 30% ,for which the overweight and obesity were the contributory factors and recommendations have been made to implement measures at community level to control body weight¹⁰ .

Research Objectives –

1. Assessment of knowledge of risk factors of metabolic Syndrome
2. Estimate the awareness about complications of metabolic Syndrome
3. Determine the general perception of metabolic Syndrome

Methods of Study-

1. Predetermined validated questionnaire is prepared which includes queries regarding knowledge awareness and perception of metabolic syndrome
2. The collected information are tested by statistical methods[chi square test] to determine significance of findings

Study Design –Questionnaire based cross sectional Study

Sample Size -100 students across Medical,Applied and Nursing Faculty

Place Of Research- Northern Border University Campus

Work Plan –The observed findings from Questionnaire are analyzed using appropriate statistical methods[chi square test]with the help of SPSS version 20 ,thereby determining Significance of the findings and comparison with other studies.

Feed back form for Questionnaire distributed to students

S.NO	Questionnaire	Male [1]			Female[2]		
		Agree	Neutral	Don't Agree	Agree	Neutral	Don't Agree
1	Do you know what is Metabolic Syndrome	1	2	3	1	2	3
1	Do you know what is Metabolic Syndrome						
2	Do You know that Overweight is risk factor of Metabolic Syndrome						
3	Do You Know that High Fat Diet is risk factor of Metabolic Syndrome						

4	Do You Know that High Salt Consumption is Risk Factor Of Metabolic Syndrome						
5	Do You Know that Smoking is risk factor of Metabolic Syndrome						
6	Do You Know that Exercise is related to Metabolic Syndrome						
7	Do You Know that Metabolic Syndrome leads to Hypertension						
8	Do You Know that Metabolic Syndrome leads to Diabetes Mellitus						
9	Do You Know that Metabolic Syndrome leads to Dyslipidemias						
10	Do You Know that Metabolic Syndrome leads to Cancers						

RESULTS-

Total of 100 responses were received and regards to average questionnaire responses about Knowledge of risk factors of Metabolic syndrome 41 males agreed ,10 males didn't agree ,9 males were not sure ,while 29 females agreed ,6 didn't agree and 5 were not sure .Pertaining to responses for awareness of metabolic syndrome complications 40 males agreed ,10 each said didn't agree and not sure,while 26 females agreed ,7 each didn't agree and were not sure.Concerning to responses of general perception of Metabolic Syndrome 40 males agreed ,6 didn't agree ,15 were not sure ,while females response was 25 agree ,4 didn't agree ,10 were not sure .The above responses were subjected to statistical analysis by Chi square test using SPSS 20 which showed a significant P value of <0.05 for all three domains of Knowledge ,awareness and Perception of Metabolic Syndrome .The results are displayed below in respective tables and compared with other studies in discussion .

Table 1 Assessment of KNOWLEDGE of Risk Factors of Metabolic Syndrome

Variable	Student Response					
	Agree		NOT Agree		Not Sure	
	Male	Female	Male	Female	Male	Female
Overweight leads to Metabolic Syndrome	42	30	8	5	9	6
Fat diet leads to Metabolic Syndrome	48	33	6	3	6	4
Smoking leads to Metabolic Syndrome	45	30	10	7	5	3
Salt rich Diet leads to Metabolic Syndrome	38	28	10	7	11	6
Lack of Exercise leads to Metabolic Syndrome	33	21	14	11	15	6
P value	< 0.05					

Table 2 Estimation of the AWARENESS about Complications of Metabolic Syndrome

Variable	Student Response					
	Agree		NOT Agree		Not Sure	
	Male	Female	Male	Female	Male	Female
Metabolic Syndrome leads to Cancers	28	17	17	11	17	11
Metabolic Syndrome leads to Dyslipidemias	42	28	8	6	10	6
Metabolic Syndrome leads to Diabetes Mellitus	48	32	5	3	5	7
Metabolic Syndrome leads to Hypertension	42	28	10	8	8	6

P value	< 0.05
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Table 3 Determination of the GENERAL PERCEPTION of Metabolic Syndrome

Variable	Student Response					
	Agree		Not agree		Not Sure	
	Male	Female	Male	Female	Male	Female
Do you know what is Metabolic Syndrome	40	25	6	4	15	10
P value	< 0.05					

DISCUSSION -

The advent of Metabolic Syndrome in the last few decades has prompted intense research into various aspects of this condition ranging from role of age sex and other factors .In a study conducted from brazil regards to factors that contributed to metabolic syndrome in the elderly it was found that gender played significant role as it showed female preponderance[67.5%] with ,median age of 71 years and the aspects that are associated with condition were hypertension[83.8%] ,overweight[50.6%] ,raised CRP [42%] ,raised cholesterol [30%] ,lack of physical activity [67.9%],high waist circumference [67%]¹¹ .High prevalence in elderly females is attributed to estrogen deficiency leading to redistribution of body fat ,truncal obesity ,insulin resistance ,dyslipidemias ,all of which contribute to metabolic syndrome¹² .In a study from ghana to evaluate the effect of diabetes on the metabolic syndrome it showed females were relatively more affected with a significant P value[< 0.05] ,with associated dyslipidemias,high waist circumference as proven in other studies also¹³ .In a study conducted in brazil to relate diet with metabolic syndrome ,it concluded that fat ,sodium rich dietary pattern 2 [DP2] was linked to development of abdominal obesity,whereas carbohydrate rich dietary pattern 3 is linked to risk of Metabolic Syndrome ,dyslipidemia,insulin resistance with statistical significance¹⁴ .In a study from china regards to effect of exercise on sleep and metabolic syndrome has revealed that persons with more than 150 min of exercise per week had good sleep and less risk of metabolic Syndrome ,contrary to those whose exercise involved less than 150 hours per week where in risk of metabolic Syndrome has increased¹⁵ .

The role of Vitamin D in Metabolic Syndrome is explored by cross sectional study which concluded the evidence of Vitamin D deficiency in Metabolic Syndrome and suggestions were made to supplement Vitamin D in the diet of at risk individuals¹⁶ .The effect of metabolic syndrome in development of cancer has revealed that the components of metabolic syndrome such as hypertension obesity are linked to various cancers rather than by metabolic syndrome itself¹⁷ .Systolic blood pressure[sbp] elevation can serve as indicator of the onset of Metabolic Syndrome ,along with more relation of former value with abdominal obesity¹⁸ .The prevalence of metabolic syndrome in patients with type 2 Diabetes is 43 % in japanese people along with significant correlation of glycemic status with body mass index¹⁹ .In a study conducted in india to evaluate questionnaire based assessment of the quality of life[TAPMETSQoL] in persons with metabolic syndrome has revealed the reliability and validity of the tool²⁰ .In the present study students response about knowledge of risk factors of metabolic Syndrome was good[p<0.05] which is similar to other study²¹ and in contrast to different study²² . Study from Japan has established utility of JAMRISC questionnaire in screening for early identification of metabolic syndrome ,diabetes and also insulin resistance²³ .Screening biomarkers suggested from a study were packed platelet volume ,total basophil count ,leukocyte count which were statistically significant²⁴ .

CONCLUSION -

Questionnaire based surveys in educational organizations help in identification of knowledge regarding Metabolic Syndrome while identifying at risk student population thereby subjecting them to educational counselling which goes long way in prevention of metabolic syndrome as proved in the findings of present study.

REFERENCES

- Khadijeh K. Farmanfarma, Alireza Ansari-Moghaddam, Mahmoud A. Kaykhaei, Mehdi Mohammadi, Hosein A. Adineh and Hasan O. Aliabdi Incidence of and factors associated with metabolic syndrome, south-east Islamic Republic of Iran East Mediterr Health J. 2021;xx(x):xxx-xxxx. <https://doi.org/10.26719/emhj.21.051>
- Pablo Pérez-Martínez, Dimitri P. Mikhailidis, [...], and José López-Miranda Lifestyle recommendations for the prevention and management of metabolic syndrome: an international panel recommendation Nutr Rev. 2017 May; 75(5): 307-326 doi: 10.1093/nutrit/nux014
- Jeffrey J. VanWormer, Jackie L. Boucher, [...], and Thomas Knickelbine Lifestyle changes and prevention of metabolic syndrome in the Heart of New Ulm Project

- Preventive Medicine Reports 6 (2017) 242–245
4. Suzan A. Haidar , Nanne de Vries , Kalliopi-Anna Poulia , Hussein Hassan , Mohammad Rached and Mirey Karavetian Neck Circumference as a Screening Tool for Metabolic Syndrome among Lebanese College Students Diseases 2022, 10, 31. <https://doi.org/10.3390/diseases10020031>
 5. Pami R, Mahajan A. The metabolic syndrome and menopause. *J Mid-life Health* 2018;9:111-2
 6. Mohammad G. Saklayen The Global Epidemic of the Metabolic Syndrome Current Hypertension Reports (2018) 20: 12 <https://doi.org/10.1007/s11906-018-0812-z>
 7. Yahia et al. Assessment of college students awareness and knowledge about conditions relevant to Metabolic Syndrome Diabetology & Metabolic Syndrome 2014, 6:111 <http://www.dmsjournal.com/content/6/1/111>
 8. Al-Thani MH, Al-Thani AAM, Cheema S, et al Prevalence and determinants of metabolic syndrome in Qatar: results from a National Health Survey *BMJ Open* 2016;6:e009514. doi:10.1136/bmjopen-2015-009514
 9. Youjin Je ScD, Youngyo Kim BS, Taeyoung Park Development of a self-assessment score for metabolic syndrome risk in non-obese Korean adults *Asia Pac J Clin Nutr* 2017;26(2):220-226
 10. Yuvaraj Krishnamoorthy.; Sathish Rajaa.; Sharan Murali, Jayaprakash Sahoo.; Sitanshu Sekhar Kar, Association Between Anthropometric Risk Factors and Metabolic Syndrome Among Adults in India: A Systematic Review and Meta-Analysis of Observational Studies *Prev Chronic Dis* 2022;19:210231. DOI: <https://doi.org/10.5888/pcd19.210231>.
 11. Silva PAB, Sacramento AJ, Carmo CID, Silva LB, Silqueira SMF, Soares SM. Factors associated with metabolic syndrome in older adults: a population-based study. *Rev Bras Enferm*. 2019;72(Suppl 2):221-8. doi: <http://dx.doi.org/10.1590/0034-7167-2018-0620>
 12. Tsai SS, Lin YS, Hwang JS, Chu PH. Vital roles of age and metabolic syndrome-associated risk factors in sex-specific arterial stiffness across nearly lifelong ages: possible implication of menopause and andropause. *Atherosclerosis* [Internet]. 2017 [cited 2018 Apr 20];258:26-33. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/28182996>
 13. Francis Agyemang-Yeboah, Benjamin Ackon Jnr. Eghan, Max Efui Annani-Akollor, Eliezer Togbe, Sampson Donkor, and Bright Oppong Afranie. Evaluation of Metabolic Syndrome and Its Associated Risk Factors in Type 2 Diabetes: A Descriptive Cross-Sectional Study at the Komfo Anokye Teaching Hospital, Kumasi, Ghana *BioMed Research International* Volume 2019, Article ID 4562904, 8 pages <https://doi.org/10.1155/2019/4562904>
 14. Ramírez-López G, Flores-Aldana M, Salmerón J. Associations between dietary patterns and metabolic syndrome in adolescents. *Salud Publica Mex*. 2019;61:619-628. <https://doi.org/10.21149/9541>.
 15. Chou F-Y, Chiu T-F, Huang F-W, Hsu T-Y, Liu C-Y, Lin C-H, Huang P-Y, Lin K-M and Wu S-H (2023) The effect of exercise on the risk of metabolic syndrome associated with sleep insufficiency: a cross-sectional study. *Front. Cardiovasc. Med*. 10:1192241. doi: 10.3389/fcvm.2023.1192241
 16. Pathania M, Dhar M, Kumar A, et al. (April 30, 2023) Association of Vitamin D Status With Metabolic Syndrome and Its Individual Risk Factors: A Cross-Sectional Study. *Cureus* 15(4): e38344. doi:10.7759/cureus.38344
 17. Puente D, LópezJiménez T, Cos-Claramunt X, et al. Metabolic syndrome and risk of cancer: a study protocol of case–control study using data from the Information System for the Development of Research in Primary Care (SIDIAP) in Catalonia. *BMJ Open* 2019;9:e025365. doi:10.1136/bmjopen-2018-025365
 18. Yue Yuan, et al Predictive Role of Child-To-Adult Blood Pressure Trajectories for Incident Metabolic Syndrome: 30-Year Hanzhong Adolescent Hypertension Study *Endocrine Practice* VOLUME 27, ISSUE 5, P433-442, MAY 20212020DOI: <https://doi.org/10.1016/j.eprac.2020.09.010>
 19. Yasushi Ishigaki , Tetsuaki Hirase , Swathi Pathadka , Zhihong Cai , Manaka Sato , Ryo Takemura , Noriyuki Ishida Prevalence of Metabolic Syndrome in Patients with Type 2 Diabetes in Japan: A Retrospective Cross-Sectional Study *Diabetes Ther* 2024 Jan;15(1):245-256. doi: 10.1007/s13300-023-01484-4. Epub 2023 Oct 19.
 20. Kethireddy K, Talla V, Pasam Ns, Koutika N, Hunsur Nagendra V deveLopMent, vaLidation, and piLot testing of MetaboLiC syndRoMe quaLiTy of Life questionnaiRe (tapMetsqoL) VALUE IN HEALTH 19 (2016) A807–A918
 21. Soundarya Vemuri (1) , Krishna Veni D V (2) , Chigulapalli Neha (3) , Sravya Reddy (4) A questionnaire study on knowledge and awareness of metabolic syndrome and it's components in undergraduate medical students at entry level *International Journal Of Research In Pharmaceutical Sciences* Vol. 11 No. 3 (2020): Volume 11 Issue
 22. Yahia et al Assessment of college students' awareness and knowledge about conditions relevant to metabolic syndrome Diabetology and Metabolic Syndrome *Bio Med Central* 2014
 23. Ce Tan et al Evaluation of the Japanese Metabolic Syndrome Risk Score (JAMRISC): a newly developed questionnaire used as a screening tool for diagnosing metabolic syndrome and insulin resistance in Japan *Environ Health Prev Med*. 2016 Nov; 21(6): 470–479. Published online 2016 Oct 3. doi: 10.1007/s12199-016-0568-5
 24. Qiao-Ying Xie, Ming-Wei Wang, Zu-Ying Hu, Cheng-Jian Cao, Cong Wang, Jing-Yu Kang, Xin-Yan Fu, Xing-Wei Zhang, Yan-Ming Chu, Zhan-Hui Feng and Yong-Ran Cheng