ORIGINAL RESEARCH PAPER

Volume - 14 | Issue - 08 | August - 2025 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

ASSESSMENT OF DIETARY INTAKES, GUT HEALTH, AND STRESS SCORE IN PATIENTS DIAGNOSED WITH ASTHMA AGED 18 TO 45 YEARS IN MUMBAI, INDIA

Home Science

Sayed Munazza Zahid Hasan — Student of SY MSc. Specialized in Pediatric Nutrition, at Sir Vithaldas Thackersey College of Home Science (Empowered Autonomous), SVT College of Home Science (Empowered Autonomous Status)

Dr. Nisha Bellare* — Assistant Professor, at Sir Vithaldas Thackersey College of Home Science (Empowered Autonomous), SVT College of Home Science (Empowered Autonomous Status)*Corresponding Author

ABSTRACT

Asthma is an inflammatory, chronic condition that affects more than 300 million people worldwide. It is vital to understand how lifestyle factors like dietary patterns, gut health, and stress affect asthma severity to manage the disease effectively. Still, there is limited evidence for these associations, especially in urban settings like Mumbai, India. This research explored the association between dietary intake, gut health, and stress score with asthma severity in adults aged 18 to 45 years diagnosed with asthma. Forty participants were recruited by convenience sampling. Asthma severity was measured by the Asthma Control Test (ACT), and dietary intake was determined through a 24-hour dietary recall and Food Frequency Questionnaire (FFQ). Gut health was quantified with the Gastrointestinal Health Questionnaire, and stress with the Perceived Stress Scale (PSS). The results showed a significant positive correlation between certain food groups and asthma severity. In addition, higher perceived stress scores were significantly associated with worse asthma control. While gut-related symptoms were commonly reported, there was a Negative statistical correlation between gut health and asthma severity.

KEYWORDS

Asthma severity, Dietary intake, Gut health, Stress, Gastrointestinal Symptoms

INTRODUCTION

Asthma is a chronic, airway inflammatory disease that causes wheezing, coughing, and shortness of breath. Asthma bothers millions of individuals worldwide and mostly arises as a result of obesity, premature puberty, air pollution, smoking, workplace environmental irritants, and certain diseases (Goldin et al., 2024). Asthma is either allergic or nonallergic. Allergic asthma, found more in young men, is less severe, but nonallergic asthma is worse and found more often in older women and is induced by infections, stress, or irritants (Sinha & Enilari, 2019).

In addition to exercise and cigarette smoking, diet has now been found to play a role in the prevention and control of asthma by virtue of its effect on inflammation and lung function (Sumayya et al., 2021). Probiotics and vegetable diets, and especially citrus fruits and apples, are shown to improve lung function and lower asthmatic risk. Increased dairy intake in children is associated with increased symptoms and inflammation (Alwarith et al., 2020; Hosseini et al., 2017).

Gut microbiome dysregulation, due to antimicrobials and pollution, may contribute to asthma (Lee et al., 2020). Obesity worsens asthma by impairing control and steroid response, likely via oxidative stress from mitochondrial damage (Grasemann & Holguin, 2021). Early-life exposure to maternal stress may also hinder lung and immune development (Stern et al., 2020).

This study aimed to understand the relationship between the severity of asthma, Dietary intake, gut health, and stress score in adults diagnosed with asthma aged 18 to 45 years.

METHODOLOGY

A cross-sectional study was conducted in Mumbai among adults aged 18–45 years. Forty participants were selected through convenience sampling. Inclusion required mild to moderate asthma, diagnosis >6 months, and consent. Those with severe asthma or other chronic respiratory diseases were excluded. The 4-month study received ethical clearance from ISBEC.

Data were collected via a structured questionnaire. Gut health was assessed using a GI questionnaire, diet through 24-hour recall and FFQ, and stress via the Perceived Stress Scale. Analysis was done using SPSS.

RESULTS AND DISCUSSION

Asthma Severity and Demographic Associations

Among participants, 40% had mild asthma (n = 16), 47.5% moderate (n = 19), and 12.5% severe (n = 5). A significant association was found between gender and asthma severity ($\chi^2 = 9.437$, $p = 0.009$), with all severe cases in females. Asthma type was also significantly linked to severity ($\chi^2 = 13.33$, $p = 0.038$), with allergic or other types more often associated with severe cases.

No significant associations were observed for duration of diagnosis, allergy status, family history, or lifestyle exposures ($p > 0.05$), though severe cases were more frequent among those without family history or lifestyle exposures like smoking or pet contact.

Clinical and Lifestyle Characteristics

Stress levels ($\chi^2 = 7.540$, $p = 0.110$), BMI ($\chi^2 = 5.724$, $p = 0.057$), and energy intake ($\chi^2 = 2.828$, $p = 0.243$) showed a significant negative association with asthma severity. However, trends suggest that individuals with higher stress, overweight BMI (25–29.9), and calorie intake above 2500 kcal/day reported more severe asthma. While not statistically significant, these patterns point to the potential role of lifestyle factors, consistent with findings in other chronic illness studies (Grasemann & Holguin, 2021; Stern et al., 2020).

Anthropometric measurements:

In mild asthma cases (n=16), the mean age was 28.5 years, weight 68.3 kg, height 168.2 cm, and BMI 24.1 kg/m². Moderate asthma (n=19) showed a mean age of 30.3 years, weight 73.3 kg, height 171.1 cm, and BMI 25.0 kg/m². Severe asthma (n=5) had a mean age of 32.6 years, a weight of 75.2 kg, height 165.8 cm, and BMI 27.4 kg/m².

No significant correlation was found between age ($F = 35.108$, $p = 0.256$), weight ($F = 146.779$, $p = 0.283$), or height ($F = 71.474$, $p = 0.421$) and asthma severity. However, BMI was higher in severe cases, suggesting excess weight may contribute to asthma severity., supporting studies suggesting that excess weight and central adiposity can worsen asthma control (Alhammad & Alwadeai, 2023).

24-Hour Dietary Recall and Food Frequency Questionnaire

In mild asthma (n=35), mean energy intake was 1999.44 ± 190.40 kcal, protein 60.06 ± 5.70 g, carbohydrate 300.00 ± 28.53 g, and fat 62.25 ± 5.92 g. Moderate cases (n=53) had 2047.73 ± 187.36 kcal, protein 61.65 ± 5.67 g, carbohydrate 308.92 ± 27.93 g, and fat 64.04 ± 5.66 g. Severe cases (n=22) showed 2106.20 ± 190.37 kcal, protein 63.40 ± 5.73 g, carbohydrate 316.00 ± 28.43 g, and fat 65.60 ± 5.68 g. While intake increased with severity, differences weren't significant ($p > 0.05$).

However, significant correlations were found between asthma severity and intake of cereals ($\chi^2 = 23.12$, $p = 0.031$), milk products—especially curd and cheese ($\chi^2 = 30.21$, $p = 0.002$), and nuts/seeds ($\chi^2 = 12.34$, $p = 0.037$).. These results suggest that certain foods, particularly dairy and cereals, may affect asthma severity.

Curd and cheese intake showed a strong inverse relationship with asthma severity, supporting previous research linking frequent dairy consumption with reduced asthma prevalence. Milk alone wasn't significant, but cheese showed a stronger protective effect (Sveiven et al., 2021).

GUT HEALTH

Gastrointestinal symptoms like indigestion were reported across all asthma severity levels, with no significant association found ($\chi^2 = 2.468$, $p = 0.872$). Despite this, the symptom was common in all groups, suggesting factors beyond asthma severity may contribute. Studies have linked gut dysbiosis and reduced microbial diversity to asthma (Hoffmann et al., 2022; XL et al., 2021), and certain microbial profiles have been associated with reduced lung function (Begley et al., 2018).

STRESS SCORE

Among participants (N = 40), none reported low stress. Most (95%, n = 38) had moderate stress; only 5% (n = 2) reported high stress. All mild (n = 16) and moderate (n = 19) asthma cases had moderate stress. Of those with severe asthma (n = 5), 60% had moderate stress and 40% had high stress.

Table 1 - Association Between Asthma Severity and Perceived Stress Levels

Categories	No. Of participants n (%)	Mild n (%)	Moderate n (%)	Sever n (%)	Chi-Square test value	p-value
STRESS Total score						
Low stress: 0–13	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	14.737	0.001
Moderate stress: 14–26	38 (95)	16 (100)	19 (100)	3 (60.0)		
High stress: 27–40	2 (5.0)	0 (0.0)	0 (0.0)	2 (40.0)		

There was a significant association between asthma severity and perceived stress ($\chi^2 = 14.737$, $p = 0.001$), indicating higher stress levels with increasing severity. This supports findings by Stubbs et al. (2022), who reported that patients with severe asthma and comorbid anxiety or depression had worse Asthma Control Questionnaire (ACQ) and quality-of-life (QLQ) scores. Similarly, Higgins et al. (2022) found that greater psychological and occupational stress is consistently linked with poor asthma control, increased symptoms, inflammation, exacerbations, and lower quality of life.

CONCLUSION

In conclusion, this study sheds light on the complex relationship between dietary intake, gut health, and perceived stress with asthma severity among adults aged 18 to 45 years in Mumbai, India. The findings indicated that while certain factors, such as specific food items and stress levels, showed significant associations with asthma severity, others, like gastrointestinal symptoms and total energy intake, showed significant negative correlations but presented consistent trends.

REFERENCES

1. Alhammad, S. A., & Alwadeai, K. S. (2023, February 17). Asthma and its relationship with anthropometric markers among adults. PLOS. https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0281923
2. Alwarith, J., Kahleova, H., Crosby, L., Brooks, A., Brandon, L., Levin, S. M., & Barnard, N. D. (2020, May 01). The role of nutrition in asthma prevention and treatment. Nutrition review. https://academic.oup.com/nutritionreviews/article/78/ 11/928/5804968#208259862
3. Begley, L., MAdapoosi, S., Opron, K., Ndum, O., Rysso, A., & Erb-Downward, J. R. (2018). Gut microbiota relationships to lung function and adult asthma phenotype: a pilot study. BMJ Open Respiratory Research. https://bmjopenrespres.bmj.com/content/5/1/e000324
4. Goldin, J., Hashmi, M. F., & Cataletto, M. E. (2024, May 3). Asthma - StatPearls. NCBI. Retrieved July 20, 2025, from https://www.ncbi.nlm.nih.gov/books/NBK430901/
5. Grasemann, H., & Holguin, F. (2021, March 01). Oxidative stress and obesity-related asthma. Science Direct. https://www.sciencedirect.com/science/article/abs/pii/S152605422030083X
6. Higgins, E. T., Davidson, R. J., Busse, W. W., Klaus, D. R., Bednarek, G. T., Sachs, R., & Rosenkranz, M. A. (2022). Clinically relevant effects of Mindfulness-Based Stress Reduction in individuals with asthma. Science direct. https://www.sciencedirect.com/science/article/pii/S2666354622000990?via%3Dihub
7. Hoffmann, A., Strozik, T., Wasiak, T., Buczylko, K., & Pawliczak, R. (2022). Compositional differences between gut microbiota of adult patients with asthma and healthy controls. Europe PMC. https://europepmc.org/article/med/36909900
8. Hosseini, B., Berthon, B. S., Wark, P., & Wood, L. G. (2017, December 8). Effects of Fruit and Vegetable Consumption on Risk of Asthma, Wheezing and Immune Responses: A Systematic Review and Meta-Analysis. MDPI. https://www.mdpi.com/2072-6643/9/4/341
9. Lee, k. A., Su, J. L., Kelly, R. S., Litonjua, A. A., & Weiss, S. T. (2020, March 6). Gut Microbial-Derived Metabolomics of Asthma. MDPI. https://www.mdpi.com/2218-1989/10/3/97
10. Sinha, S., & Enilari, O. (2019, January 22). The Global Impact of Asthma in Adult Populations. Retrieved July 20, 2025, from https://pmc.ncbi.nlm.nih.gov/articles/PMC7052341/
11. Stern, J., Pier, J., & Litonjua, A. A. (2020, Februray 04). Asthma epidemiology and risk factors. Springer nature. https://link.springer.com/article/10.1007/s00281-020-00785-1
12. Stubbs, M. A., Clark, V. L., Mcdonald, V. M., Gibson, P. G., & Yorke, J. (2022, December 12). Associations of symptoms of anxiety and depression with health-status, asthma control, dyspnoea, dysfunction breathing and obesity in people with severe asthma - Respiratory Research. Respiratory Research. Retrieved July 20, 2025, from https://respiratory-research.biomedcentral.com/articles/10.1186/s12931-022-02266-5#citeas
13. Sumayya, S., Parveen, S., Hussain, M. A., & Nayak, S. P. S. (2021). Role of diet in asthma and chronic obstructive pulmonary disease. World Journal of Biology Pharmacy and Health Sciences, 05(03), 53-65.
14. Sveiven, S. N., Bookman, R., Ma, J., lynden, E., Hanson, C., & Nordgren, T. M. (2021, April 2). Milk Consumption and Respiratory Function in Asthma Patients: NHANES Analysis 2007–2012. MDPI. Retrieved July 20, 2025, from https://www.mdpi.com/2072-6643/13/4/1182
15. Wang, Z., Lai, Z., Zhang, X., Huang, P., Xie, J., Jiang, Q., Zhang, Q., & Chung, K. F. (2021). Altered gut microbiome compositions are associated with the severity of asthma, Journal. Journal of Thoracic Disease. https://jtd.amegroups.org/article/view/54245/html
16. XL, Z., JJ, W., HX, Y., DY, F., P, M., HL, Y., & WB, W. (2021, August 12). Associations between Gut microbiota and asthma endotypes | JAA. Dove Medical Press. Retrieved July 20, 2025, from https://www.dovepress.com/associations-between-gut-microbiota-and-asthma-endotypes-a-cross-secti-peer-reviewed-fulltext-article-JAA