Distribution Pattern of Serum Uric Acid Level Before and After National Festival Dashain Among Patients Visiting Tertiary Hospital, Kathmandu, Nepal

Dipesh Tamrakar¹, Sabina Shakya¹, Sadikshya Shrestha¹, Salina Pradhananga¹, Vijay Kumar Sharma¹, Eans Tara Tuladhar¹, Mithileshwar Raut¹, Aseem Bhattarai¹, Binod Kumar Yadav¹

¹Department of Biochemistry, Maharajgunj Medical Campus, Institute of Medicine, Tribhuvan University

ABSTRACT

Introduction: Dashain, one of the national festivals in Nepal, celebrated with excessive consumption of high purine content foods, alcoholic and soft beverages. These foods have been associated with higher Serum Uric Acid (SUA) levels leading to hyperuricemia. This study was intended to evaluate the distribution pattern of SUA level a month before and after this festival for two consecutive years.

Methods and Materials: The data of 5818 patients visiting Clinical Biochemistry Laboratory, Tribhuvan University Teaching Hospital for SUA test (a month before and after Dashain festival for two consecutive years; 2017 - 2018 A.D.) were collected and analyzed. The statistical analysis was done using SPSS version 21. Continuous variables were expressed as mean ± SD taking 95% confidence interval and p values of <0.05 was considered to be statistically significant. Mann-Whitney U test was used to compare the variables.

Results: The mean SUA levels before and after Dashain in two consecutive years were 333.5 ± 112.1 µmol/L and 334.2± 114.7 µmol/L in 2017 A.D. and 322.6 ± 103.9µmol/L and 343.2± 111.4 µmol/L in 2018 A.D. There was a significantly elevated level of the mean SUA level after Dashain festival in 2018 among both sexes (p-value <0.05). The age-wise distribution of mean SUA after the Dashain festival was consistent with increasing age among the study population.

Conclusion: The study concluded that the Dashain festival has an impact on increasing the SUA level.

Keywords: Serum Uric Acid, High Purine diets, Dashain festival

INTRODUCTION

Uric acid is the end product of purine metabolism.¹ Its level differs significantly within individuals as the result of high purine diet, conditions with high nucleic acid turnover and enzymatic defects in purine metabolism.²⁻⁴ Some studies have shown the intake of alcohol as one of the prime reasons for hyperuricemia.⁵ "The consumption of meat products, sugar-sweetened drinks and other purine-rich foods have shown to be the reason for hyperuricemia, a condition of elevated Serum Uric Acid (SUA) level."⁷⁻⁸ The higher prevalence of hyperuricemia has been shown among Nepalese population.⁹⁻¹⁰ This condition has been associated mostly with dietary habits and other various clinical conditions.¹¹⁻¹² The dietary pattern varies with different festivals celebrated in Nepal, among them Dashain is one of the national festivals celebrated for days by many ethnic groups wherein families gather annually.¹³⁻¹⁴ This festival is celebrated with high intake of meat products, alcoholic and sugar-sweetened soft beverages (high purine content foods).¹⁵ The increased turnover of such foods during the celebration of the festival could be one of the reasons for the increased prevalence of hyperuricemia among the Nepalese population. Hence, this study was carried out aiming to investigate the distribution pattern of SUA level before and after the Dashain festival among the Nepalese population visiting the tertiary hospital of Kathmandu, Nepal.

METHODS AND MATERIALS

This cross-sectional study was conducted among 5,818 different patients visiting Tribhuvan University Teaching Hospital (TUTH), Kathmandu before and after the Dashain festival for two consecutive years (2017 – 2018 A.D.). This study was aimed only to observe the distribution pattern of SUA a month before and after the Dashain festival. Thus, all patients seeking biochemistry laboratory services of TUTH during this study period were enrolled. The data of SUA levels were obtained from the Department of Biochemistry, TUTH, a month before Dashain (27 August – 27 September 2017 and 16 September – 16 October 2018) and a month after Dashain (25 October – 25 November 2017 and 25 October – 25 November 2018) for two consecutive years.

Correspondence: Binod Kumar Yadav, PhD, Department of Biochemistry, Maharajgunj Medical Campus, Institute of Medicine, Tribhuvan University, E-mail: binod3aug@gmail.com
The samples with incomplete patient detail, repeated samples, insufficient volume, hemolyzed, icteric and lipemic samples were excluded. The serum separation was carried out by centrifugation and the estimation of SUA was done by the uricase method (Giesse Diagnostic kit) using a fully automated routine chemistry autoanalyzer (BT 3500, Biotechnica, Italy). The result generated by the analyzer was validated by the daily use of three levels of internal quality control sera by Randox (USA). Ethical approval for this study was taken from the Institutional Review Committee (IRC) of the Institute of Medicine (IOM), Tribhuvan University.

The statistical analysis was done using SPSS version 21. Categorical variables were expressed in frequency and percentage whereas continuous variables were expressed as mean ± SD taking 95% confidence interval and p values of <0.05 was considered to be statistically significant. Mann-Whitney U test was used to compare the variables.

RESULTS

The mean age of the enrolled patients in the study was 44.7±16.1 years with 50.10% being females. The gender-wise distribution of SUA levels is shown in Figure 1. The mild elevated mean SUA level was observed in the year 2017 with 333.5 ± 112.2 µmol/L before Dashain and 334.2 ± 114.7 µmol/L after Dashain. Similarly, in the year 2018, the mean SUA level before and after Dashain was 322.6 ± 103.9 µmol/L and 343.2 ± 111.4 µmol/L respectively (at 95% CI).

Table 1: The Mean SUA level before and after the Dashain festival for two years

| Year | Sex               | n   | SUAµmol/L Mean ± SD | Mean Rank | p-value |
|------|-------------------|-----|---------------------|-----------|----------|
| 2017 | Before Dashain Males | 714 | 369.5 ± 112.7       | 722.8     | 0.324    |
|      | After Dashain Males | 753 | 378.9 ± 118.1       | 744.6     |          |
|      | Before Dashain Females | 670 | 295.2 ± 98.1        | 742.7     |          |
|      | After Dashain Females | 805 | 292.3 ± 93.8        | 734.1     |          |
| 2018 | Before Dashain Males | 697 | 359.8 ± 104.3       | 681.6     | 0.001*   |
|      | After Dashain Males | 739 | 380.7 ± 111.7       | 753.3     |          |
|      | Before Dashain Females | 727 | 286.9 ± 90.1        | 685.3     |          |
|      | After Dashain Females | 713 | 304.3 ± 97.0        | 756.3     | 0.001*   |

** Mann-Whitney U test

The age-wise distribution of mean SUA level among different age groups of study population presented the increased level of mean SUA level after the Dashain festival (at 95% CI). (Table 2.)

Table 2: The age-wise distribution of mean SUA level before and after the Dashain festival

| Age Group (Years) | Before Dashain (n) | SUAµmol/L Mean ± SD | After Dashain (n) | SUAµmol/L Mean ± SD |
|-------------------|-------------------|---------------------|-------------------|---------------------|
| 10 – 20           | 119               | 333.8 ± 96.2        | 126               | 330.4 ± 121.1       |
| 21 – 30           | 527               | 320.9 ± 104.8       | 531               | 333.1 ± 106.1       |
| 31 – 40           | 635               | 321.2 ± 105.1       | 631               | 336.9 ± 102.8       |
| 41 – 50           | 588               | 321.5 ± 108.5       | 651               | 324.2 ± 97.2        |
| 51 – 60           | 467               | 337.2 ± 107.0       | 526               | 342.6 ± 117.4       |
| 61 – 70           | 297               | 344.2 ± 102.1       | 325               | 354.9 ± 129.3       |
DISCUSSION

Among numerous festivals celebrated in Nepal, Dashain is the most anticipated festival with long days celebration among the Nepalese community by various ethnic groups. The rituals during this festival include a slaughter of animals and worshipping goddess at different holy places of Nepal. The festive foods during this festival include meat products and often includes alcoholic beverages among most of the ethnic groups. The festivity remains for weeks and these festive foods are potent to cause hyperuricemia. Hence, this study was carried out to endeavor the distribution pattern of SUA level a month before and after the Dashain festival among the Nepalese population. Since, the consumption of these high purine content diets, alcohol and sugar-sweetened soft beverages varies among both vegetarian and non-vegetarian populations, this study included both categories seeking laboratory service at TUTH during the study period for two consecutive years.

The findings of our study showed the increased mean SUA level after the Dashain festival for two consecutive years, however, the statistically significant elevated level was observed only in the year 2018 A.D. for both sexes. The change in consumption of purine-rich festive food might be the reason for significantly elevated SUA in the year 2018, however, due to the limitations in the study, the exact reason could not be established. In contrast to our findings, the higher prevalence of hyperuricemia was shown among men only by Kumar S. et. al. study in one of the districts of Nepal. A similar study by Singh P. et. al. in one of the regions of Nepal had concluded a higher prevalence of hyperuricemia among females than males.

The augmented consumption of alcoholic beverages and festive foods enriched with high purine content during the festival might be the reason for the elevated SUA level in our study after Dashain. The dietary influences of such foods causing hyperuricemia has also been concluded in the study by Makinouchi T. et. al. and Ryu K. A. et. al. In concordance to our study, the study done in Taiwan by Tsai Y. T. et. al. has shown the relationship between high purine content foods and hyperuricemia. Furthermore, a study done in Eastern Nepal by Yadav S.K. et. al. has shown alcohol consumption as one of the causative factors for hyperuricemia.

The study on the Chinese population by Villegas R. et. al. had associated dietary habits with hyperuricemia wherein the consumption of high purine contents foods, vegetables and meat products were the prime reason for hyperuricemia. This conclusion of the study has supported the findings of our study from both vegetarian and non-vegetarian populations. The higher consumption of meat products and other high purine content vegetables are both significantly associated with hyperuricemia which is also enhanced by alcoholic beverages. Similarly, the study done in the United Kingdom by Schmidt J. et. al. has associated SUA with dietary habits where the level of SUA was highest among vegans followed by meat eaters, fish eaters and vegetarians. In the study by Choi J. W. et. al., among American people, the finding represented the association of elevated SUA level with excessive consumption of sugar-sweetened soft drinks. These multiple studies had stated the role of various foods and drinks behind hyperuricemia that had buttressed the Dashain festive dietary habits of the Nepalese population attributing to an increasing level of uric acid post-Dashain.

The age-wise distribution of the mean SUA level in our study presented the elevated level of SUA among all age groups after the Dashain festival. The elevated mean SUA level after the Dashain festival was consistent with increasing age and might suggest the risk of hyperuricemia with festive food and aging. Nevertheless, the distribution of mean SUA levels was inconsistent with age before the Dashain festival.

CONCLUSION

From this study, we can conclude that the Dashain festival has an impact on increasing the SUA level.

LIMITATIONS

Since this was a single centered study and based on patients visiting a tertiary hospital, this study might not represent the entire community to set a definitive conclusion and recommendation. The detailed dietary and drinking habit during the festival, clinical history, medications and ethnicity, if included, could have strengthened the impact of the study. Moreover, the study was also conducted on different patients before and after the Dashain festival, if the same patients were followed after the festival with detail variables mentioned above, it would yield a concrete conclusion.

Conflict of Interest

We declare that we have no conflict of interest.
ACKNOWLEDGMENT

We are thankful to the laboratory department of biochemistry, TUTH for cooperation during the entire period of the study and are gratified to IRC, IOM for ethical clearance in conducting this research.

REFERENCES:

1. Burtis CA, Ashwood ER, Bruns DE. Tietz Textbook of Clinical Chemistry and Molecular Diagnostics. London: Elsevier Health Sciences; 2012.
2. Villegas R, Xiang YB, Elasy T, Xu WH, Cai H, Cai Q, et al. Purine-rich foods, protein intake, and the prevalence of hyperuricemia: the Shanghai Men’s Health Study. Nutrition, metabolism, and cardiovascular diseases: NMCD. 2012;22(5):409-16.
3. Lama B, Roka Pun H, Ram Bastola S, Koirala N. Association of rs2231142 with Serum Uric Acid among the Nepalese Patient Visiting the Tertiary Care Hospital 2017. 000113 p.
4. Tsai YT, Liu JP, Tu YK, Lee MS, Chen PR, Hsu HC, et al. Relationship between dietary patterns and serum uric acid concentrations among ethnic Chinese adults in Taiwan. Asia Pacific journal of clinical nutrition. 2012;21(2):263-70.
5. Li Z, Guo X, Liu Y, Chang Y, Sun Y, Zhu G, et al. The Relation of Moderate Alcohol Consumption to Hyperuricemia in a Rural General Population. International journal of environmental research and public health. 2016;13(7).
6. Yamanaka H. [Alcohol ingestion and hyperuricemia]. Nihon rinsho Japanese journal of clinical medicine. 1996;54(12):3369-73.
7. Schmidt JA, Crowe FL, Appleby PN, Key TJ, Travis RC. Serum uric acid concentrations in meat eaters, fish eaters, vegetarians and vegans: a cross-sectional analysis in the EPIC-Oxford cohort. PloS one. 2013;8(2):e56339.
8. Ryu KA, Kang HH, Kim SY, Yoo MK, Kim JS, Lee CH, et al. Comparison of nutrient intake and diet quality between hyperuricemia subjects and controls in Korea. Clinical nutrition research. 2014;3(1):56-63.
9. Kumar S. SAR, Takhelmayum R., Shrestha P., Sinha J. N. Prevalence of hyperuricemia in Chitwan District of Nepal. Journal of college of Medical Sciences. 2010;6(2):18-23.
10. Singh P. KsAMRK. Prevalence of hyperuricemia at Nepalgunj Medical College, Banke-Nepal. Bali Medical Journal. 2012;1(3):108-11.
11. You L, Liu A, Wuyun G, Wu H, Wang P. Prevalence of hyperuricemia and the relationship between serum uric acid and metabolic syndrome in the Asian Mongolian area. Journal of atherosclerosis and thrombosis. 2014;21(4):355-65.
12. Torralba KD, De Jesus E, Rachabattula S. The interplay between diet, urate transporters and the risk for gout and hyperuricemia: current and future directions. International journal of rheumatic diseases. 2012;15(6):499-506.
13. Chamberlain LK. Durga and the Dashain harvest festival from the Indus to Kathmandu Valleys. Revision. 2002;25(1):24-33.
14. https://en.wikipedia.org/wiki/Dashain. Dashain. 2019;Cited on 1 January 2020.
15. Kalpit P. Young Hindus against Dashain animal slaughter. 2012.
16. Diagnostics G. Uric Acid Protocol. 2014(2).
17. Makinouchi T, Sakata K, Oishi M, Tanaka K, Nogawa K, Watanabe M, et al. Benchmark dose of alcohol consumption for development of hyperuricemia in Japanese male workers: An 8-year cohort study. Alcohol. 2016;56:9-14.
18. Shrawan Y, Nirag N, DilliRam N. Prevalence of Hyperuricemia among People of Morang District of Nepal. 2014;3(-1).
19. Choi JW, Ford ES, Gao X, Choi HK. Sugar-sweetened soft drinks, diet soft drinks, and serum uric acid level: the Third National Health and Nutrition Examination Survey. Arthritis and rheumatism. 2008;59(1):109-16.