International Journal of Clinical Biochemistry and Research 2022;9(3):224–228

Content available at: https://www.ipinnovative.com/open-access-journals

International Journal of Clinical Biochemistry and Research

Journal homepage: https://www.ijcbr.in/

Original Research Article

Physiological and biochemical parameters of smokers and alcohol consuming adults from Terai region of Nepal using cross-sectional study

Mingma Lhamu Sherpa[1], Birendra Kumar Jha[2,*], Jitendra Kumar Singh[3], Binod Kumar Dahal[4], Chamma Gupta[1]

[1]*Dept. of Biochemistry, Sikkim Manipal Institute of Medical Sciences, Sikkim Manipal University, Gangtok, Sikkim, India*
[2]*Dept. of Biochemistry, Janaki Medical College, Tribhuwan University, Janakpurdham, Nepal*
[3]*Dept. of Community Medicine, Janaki Medical College, Tribhuwan University, Janakpurdham, Nepal*
[4]*Dept. of Medicine, Janaki Medical College, Tribhuwan University, Janakpurdham, Nepal*

ARTICLE INFO

Article history:
Received 24-06-2022
Accepted 17-08-2022
Available online 27-09-2022

Keywords:
Chronic disease
Waist circumference
Life style
Body mass index

ABSTRACT

Background: Non-communicable chronic diseases (NCD) are contributing 46% to the global diseases burden and account for 59% of annual death. Tobacco and alcohol consumptions are reported as major factors associated with growing burden of NCDs and account for 11.5% of global death with around 80% of these deaths are reported in low middle-income countries.
Nepal, a low middle-income county, is also facing an increasing prevalence (31%) of NCDs with a significant prevalence of smoking (37.1%) and alcohol consumption (15%-57%).
Aim: To explore the physiological and biochemical parameters of smoker and alcohol consuming subjects of Terai region of Nepal.
Materials and Methods: We conducted a community based cross-sectional study during August to November 2019, 282 adult participants were selected from Terai region of Janakpur Zone, Nepal, After obtaining written consent and clinical examination, fasting venous blood was collected from study subjects and examined for triglycerides, total cholesterol, HDL-cholesterol, LDL-cholesterol and fasting blood sugar.
Results: We observed significantly increased triglycerides ($p<0.05$), and waist circumference ($p<0.05$) in current smoking and alcohol consuming subjects, however diastolic blood pressure was found to be significantly higher among alcohol consuming subjects only ($p=0.05$). We did not observe any significant correlation between fasting blood sugar, total-cholesterol and LDL-cholesterol among smoking or alcohol consuming subjects.
Conclusion: Significantly increased triglycerides, waist circumference and diastolic blood pressure in smoking and alcohol consuming subjects likely suggest lack of public awareness and heath promotion activities in Teari region of Nepal and indicate an urgent public health awareness programs in this region to maintain quality of life.

1. Introduction

Besides rapid urbanization, sedentary lifestyle and growing economy, consumption of alcohol and tobacco products are also reported as significant factors involved in increased morbidity and mortality.[1,2] Tobacco and alcohol consumption are major risk factors associated with an increasing prevalence of chronic diseases and accounted for 11.5% of global death, with around 80% of these deaths in low middle-income countries.[3–7] Nepal is

* *Corresponding author*.
E-mail address: akshatjmc@yahoo.com (B. K. Jha).

https://doi.org/10.18231/j.ijcbr.2022.044

also experiencing an increasing prevalence (31%) of NCDs, along with smoking (11.1%-37.1%) and alcohol consumption (15%-57).[8–10] This study was designed to explore the physiological and biochemical parameters of smokers and alcohol consumer adults from the Terai region of Nepal.

2. Materials and Methods

This was a community based cross-sectional study carried out during August to November 2019 in the Terai region of Janakpur Zone, Nepal. Participant selection and sample collection were done by camp approach. Radio announcement, wall poster and an extensive volunteer mobilization were used to inform the target population by establishing a joint approach between government health service networks and research team. The demographic and life style details of participants were collected using a structured questionnaire. Participant's waist circumference, height, weight and blood pressure were measured by either a physician or trend paramedical staffs. Subjects below 18 years and above 80 years and having history of any abdominal surgery were excluded from the study. After physical examination, 5 ml of fasting venous blood sample was collected maintaining aseptic condition from the participants meeting inclusion criteria and samples were transferred in the fluoride vial (Yash polymers, A/8/4, Sahajanand Tower, Jivraj park cross road, Jivrajpark, Ahmedabad, Gujarat, India) immediately. Sample containing vials were centrifuged to obtain serum. Fasting blood glucose, total cholesterol, triglycerides (TAG), high density lipoprotein (HDL) and low-density lipoprotein (LDL) cholesterol were estimated from serum sample by enzymatic method using Accent 200 fully automated biochemistry analyzer (PZ Cormay S. A. Warsaw office, 303 Pulawska Str., 02-785 Marsaw).[11–15]

Instructions of IDF regarding central obesity measurement were strictly followed for waist circumference measurement.[16] A measuring tape in a horizontal plane around abdomen at midway between the inferior margin of the ribs and the superior boarder of the iliac crest was placed. Measurement was done at the end of normal expiration, without any compression on the skin. Blood pressure (BP) measurement was carried out using standard mercury sphygmomanometer by a physician or trend paramedical staffs. Participants were requested to rest for at least 10 minutes, before BP measurement. BP was measured in the appropriate sitting position. Initially, BP was measured on both arms; the arm showed higher BP was used for second BP measurement.

2.1. Statistical analysis

Statistical analysis was performed using SPSS version 23.0. Data are expressed as numbers or means ± SD. One-way ANOVA (with Tukey's post hoc) was adopted for the comparison of physiological and biochemical parameters. Correlation was applied to examine the correlation between Diastolic Blood Pressure, Triglycerides and Waist Circumference. P-value <0.05 was considered statistically significant.

3. Results

Physiological parameters observed in smokers and alcoholic are shown in Table 1. A significant difference for waist circumference and diastolic blood pressure were observed among smokers ($p< 0.05$) as well as among alcohol consuming ($p< 0.05$) subjects, while other parameters (age, BMI, systolic blood pressure) were not statistically different in both groups.

Biochemical parameters estimated for smokers and alcohol consuming subjects are presented in Table 2. We observed significant difference for triglycerides among alcoholic ($p=0.016$) as well as in smokers ($p=0.028$). However other biochemical parameters (fasting blood sugar, total-cholesterol, HDL-cholesterol, LDL-cholesterol) were not found to be significantly different in both groups.

Multiple comparison for physiological and biochemical parameters among smokers (current vs former or current vs never or former vs never) as well as alcohol consuming subjects (current vs former or current vs never or former vs never) are shown in Table 3. Triglycerides were significantly increased among current smokers ($p=0.038$) and current alcohol consuming ($p=0.014$) subjects compared to subjects who had never smoked or taken alcohol. Likewise, waist circumference was also found to be significantly increased among current smokers ($p<0.0001$), current alcohol consuming ($p<0.0001$)subjects compared to subjects who had never smoked or consumed alcohol. Moreover, diastolic blood pressure was significantly increased among current smokers ($p=0.050$) compared to never smoker. However, we did not find any significant differences for physiological and biochemical parameters among current and former ($p>0.05$) and among former and never ($p>0.05$) smokers as well as alcohol consumed subjects except for waist circumference between former and never alcohol consumed subjects ($p=0.049$).

Correlations between Waist Circumference, Diastolic Blood Pressure and Triglycerides among smokers and alcohol consuming subjects are presented in Table 4. We did not observe any significant correlation between waist circumference, diastolic blood pressure and triglycerides among either current, former or never smokers ($p>0.05$) as well as among current, former or never alcohol consumed subjects, except a significant positive correlation between diastolic blood pressure and waist circumference among current smokers ($p=0.046$) and current alcohol consuming subjects ($p=0.022$).

Table 1: Physiological characteristics (Mean±SD) of subjects by smoking and alcohol consumption Status (n=282), p-value represents significance of overall difference among respective groups

Characteristics	Age (years)	BMI (kg/m2)	Waist Circumference. (cm)	Blood Pressure (mm of Hg)	
				Diastolic	Systolic
Smoking Status					
Current (n=21)	39.76±7.83	28.79±2.62	102.38±6.67	82.86±8.45	126.67±15.59
Former (n=4)	51.25±16.87	28.95±1.15	103.00±1.82	87.50±9.57	137.50±22.17
Never (n=257)	42.77±12.14	27.34±5.27	93.79±8.61	79.61±8.04	123.40±14.69
p-value	0.192	0.385	<0.0001	0.038	0.115
Alcohol Consumption Status					
Current (n=28)	39.68± 7.07	28.82±3.34	77.62±9.54	83.21±8.18	127.50±14.04
Former (n=5)	52.40±12.60	27.96±1.53	77.32±0.95	84.00±8.94	130.00±23.45
Never (n=249)	42.76±12.27	27.31±5.29	64.68±13.00	79.52±8.06	123.31±14.81
p-value	0.067	0.325	<0.0001	0.040	0.241

Table 2: Biochemical parameters (Mean ± SD) of subjects by smoking and alcohol consumption status (n=282), p-value represents significance of overall difference among respective groups

Characteristics	Triglycerides (mg/dl)	Fasting Blood Sugar (mg/dl)	Cholesterol (mg/dl)		
			HDL	LDL	Total
Smoking Status					
Current (n=21)	205.19±101.10	84.29±14.14	40.39±21.65	113.57±26.53	191.80±35.75
Former (n=4)	207.75±71.46	94.50±8.69	32.62±1.36	112.50±18.62	202.50±42.84
Never (n=257)	160.55±77.60	96.75±34.62	36.52±7.94	118.86±31.83	184.66±49.79
p-value	0.028	0.260	0.142	0.707	0.635
Alcohol Consumption Status					
Current (n=28)	205.28±96.75	93.00±28.28	40.20±18.75	118.50±24.94	204.7151.73
Former (n=5)	141.20±24.02	87.40±14.63	33.02±1.18	94.00±13.80	172.00±30.07
Never (n=249)	160.43±78.06	96.27±34.25	36.44±8.02	118.85±32.04	183.55±48.36
p-value	0.016	0.757	0.099	0.214	0.077

Table 3: Multiple comparison of physiological and biochemical parameters by smoking and alcohol consumption status (n=282)

Characteristics	Smoking Status			Alcohol Consumption Status		
	Pa	Pb	Pc	Pa	pb	pc
Waist Circ.	0.990	<0.0001	0.079	0.999	<0.0001	0.049
DBP	0.545	0.183	0.131	0.978	0.050	0.440
Triglycerides	0.998	0.038	0.469	0.223	0.014	0.854

pa= Significance of difference of means between Current and Former
pb= Significance of difference of means between Current and Never
pc= Significance of difference of means between Former and Never

Table 4: Correlations between physiological and biochemical parameters by smoking and alcohol consumption status

Variables		Waist Circumference				
	Status of Smoking	r [a]	p-value	Status of Alcohol Consumption	r	p-value
Diastolic Blood Pressure	Current	0.441	0.046	Current	0.432	0.022
	Former	0.191	0.809	Former	0.241	0.696
	Never	0.099	0.113	Never	0.080	0.208
	Current	0.124	0.593	Current	0.140	0.476
Triglycerides	Former	0.575	0.425	Former	0.369	0.542
	Never	0.111	0.077	Never	0.109	0.086

[a] Pearson correlation coefficient

4. Discussion

Nepal, known for its incredible geographical and demographic diversity, is a small land-locked developing country of South East Asia. On the basis of geography, Nepal is categorized into Himalaya, Mountainous and Terai regions. It is a low middle-income country and traditional agriculture is the major occupation, which shares nearly 45% of the total national GDP. Despite of various approaches of government towards controlling the use of tobacco and alcohol consumption, their uses are increasing. The use of tobacco and alcohol consumption has been found to be associated with increasing burden of chronic diseases globally. The increasing trend of NCDs in Nepal, are also likely pointing towards the underlying association of use of tobacco and alcohol consumption.

This study design approached to explore the demographic and biochemical parameters of subjects using tobacco (Smoker), consuming alcohol and their potential association with the NCDs. It was a cross-sectional study, in which participants were categorized as current, former (participants reported not smoking/alcohol consumed for at least 6 months prior to the study and never used tobacco (smoking) and consumed alcohol. Physiological parameters observed in smokers and alcoholic subjects are presented in Table 1. Our results demonstrated that smokers as well as alcoholic subjects had significantly increased waist circumference and diastolic blood pressure ($p<0.001$). A cohort study carried out in Chinese adult male twins, also found that alcohol consumption and current smoking were associated with increased waist circumference.[16] Similarly, another cohort study conducted in Denmark, found significant association of alcohol consumption frequency with increased waist circumference.[17] The systolic blood pressure of both group were found to be not significantly different in our study, however, diastolic blood pressure was significantly different in both smoker ($p<0.038$) and alcohol consuming ($p<0.040$) subjects. Similar association between smoking, alcohol consumption and blood pressure have been reported in various studies.[18,19] Average age of current, former and never smoking (39.7±7.83, 51.25±16.87 and 42.77±12.14) and alcohol consuming (39.68±7.07, 52.40±12.60 and 42.76±12.27) subjects were not very different. The BMI of current smokers (28.79±2.62) and alcohol consuming (28.82±3.34) subject were comparatively higher than that of former and never group, however, without any significant statistical differences.

Biochemical parameters estimated in smokers and alcohol consuming subjects are presented in Table 2. We observed significantly increased triglycerides in both: smokers ($p<0.028$) and alcohol consuming subjects (($p<0.016$). However other biochemical parameters (fasting blood sugar, total-cholesterol, HDL-cholesterol, LDL cholesterol) were not found significantly different in both the groups. Various studies on smokers and alcohol consuming subjects have shown dyslipidemia (high triglycerides, high total-cholesterol, high LDL-cholesterol and low HDL-cholesterol) and have found these to be predisposing to increasing risk of cardiovascular abnormalities and metabolic syndrome.[20,21] In contrast, we found only increased level of triglycerides in both groups, without any significant increase of other parameters of lipid profile. Similar increased level of triglycerides ($p<0.032$) have reported in a study conducted in Greece among smokers and alcohol consumers in 2003.[22]

Multiple comparison for physiological and biochemical parameters among smokers (current vs former, current vs never and former vs never) as well as alcohol consuming subjects (current vs former, current vs never and former vs never) are shown in Table 3. It was found that triglycerides were significantly increased in current smokers ($p<0,038$) and current alcohol consuming subjects ($p<0.014$), compared to the subjects who had never smoked or consumed alcohol. Similarly, waist circumference was also significantly increased in current smokers ($p<0.001$) and current alcohol consuming subjects ($p<0,001$), compared to subjects who had never smoked or consumed alcohol. Furthermore, diastolic blood pressure was significantly increased in current smokers ($p<0.05$), compared to never smokers. The significantly increased level of triglycerides, waist circumference and diastolic blood pressure in current smokers and alcohol consuming compared to never smoker or never consumed alcohol group strongly suggest the likely association of smoking and alcohol consumptions in many NCDs, including cardiovascular abnormalities. A similar study carried out in north-eastern region of the Netherlands, also reported the increased triglycerides, waist circumference and blood pressure in current smoking and alcoholic group.[23] Likewise, similar study conducted in Korean adults has also reported hypertriglyceridemia, increased waist circumference and increased blood pressure in current smokers and alcoholic subjects. However, our result did not show any significant differences for physiological and biochemical parameters in current and former ($p>0.05$) and among former and never ($p>0.05$) smokers as well as alcoholic subjects, except waist circumference between former and never alcoholic subjects ($p<0.049$) which was marginally significant.[24]

Furthermore, the correlations between waist circumference, diastolic blood pressure and triglycerides of both groups are presented in Table 4. A significant positive correlation has been observed between diastolic blood pressure and waist circumference in current smokers ($p<0.046$) and current alcohol consuming subjects ($p<0.022$). However, we did not observe any significant correlation between waist circumference, diastolic blood pressure and triglycerides among either current, former of

never smokers (p>0.05)

5. Conclusion

This study explored the physiological and biochemical parameters of smokers and alcohol consuming subjects from Terai region of Nepal. Triglycerides, waist circumference and diastolic blood pressure were found to be significantly increased in smokers and alcohol consuming subjects, which may likely contribute to increased NCDs in Nepal. The study suggests lack of public awareness as well as health promotion activities in this region for smoking and alcohol consumption, and indicates the need for an urgent step towards needed public health programs to maintain quality of life.

6. Source of Funding

None.

7. Conflict of Interest

None.

8. Acknowledgement

We would like to thank academicians and authorities of Janaki Medical College, Janakpurdham, Nepal and Sikkim Manipal Institute of Medical Sciences, Gangtok, Sikkim, India for their academic guidance and support. We extend our sincere thanks to Mr. Vijay Jha, director of the Office of Health Directorate, Province 2, Janakpurdham, for his kind cooperation during this study.

References

1. Mctigue KM, Harris R, Hemphill B, Lux L, Sutton S, Bunton AJ, et al. 2003.
2. Haffner S, Taegtmeyer H. Epidemic obesity and the metabolic syndrome. *Circulation*. 2003;108(13):1541–5.
3. John U, Hill A, Rumpf HJ, Hapke U, Meyer C. Alcohol high risk drinking, abuse and dependence among tobacco smoking medical care patients and the general population. *Drug Alcohol Depend*. 2003;69(2):189–95.
4. Zhou Y, Zheng J, Li S, Zhou T, Zhang P, Li HB. Alcoholic beverage consumption and chronic diseases. *Int J Environ Res Public Health*. 2016;13(6):522.
5. Ng R, Sutradhar R, Yao Z, Wodchis WP, Rosella LC. Smoking, drinking, diet and physical activity-modifiable lifestyles risk factors and their associations with age to first chronic disease. *Int J Epidemiol*. 2020;49(1):113–30.
6. World Health Organization. Global status report on noncommunicable diseases 2014. World Health Organization; 2014. Available from: https://apps.who.int/iris/handle/10665/148114.
7. Reitsma MB, Fullman N, Ng M, Salama JS, Abajobir A, Abate KH, et al. Smoking prevalence and attributable disease burden in 195 countries and territories, 1990–2015: a systematic analysis from the Global Burden of Disease Study 2015. *Lancet*. 2017;389(10082):1885–1906.
8. Bhandari GP, Angdembe MR, Dhimal M, Neupane S, Bhusal C. State of non-communicable diseases in Nepal. *BMC Public Health* . 2014;14:23. doi:10.1186/1471-2458-14-23.
9. Sagtani RA, Thapa S, Sagtani A. Smoking and Quality of Life - Is there really an association? Evidence from a Nepalese sample. *PLoS One*. 2019;14(9):e022179.
10. Sagtani RA, Thapa S, Sagtani A. Smoking and Quality of Life-Is there really an association? Evidence from a Nepalese sample. *PLoS One*. 2019;14(9):e0221799.
11. Trinder P. Determination of Glucose in Blood Using Glucose Oxidase with an Alternative Oxygen Acceptor. *Ann Clin Biochem*. 1969;6(1969):24.
12. Richmond W. Analytical reviews in clinical biochemistry: the quantitative analysis of cholestero. *Ann Clin Biochem*. 1992;29:577–97.
13. Bucolo G, David H. Quantitative determination of serum triglycerides by the use of enzymes. *Clin Chem*. 1973;19(5):476–82.
14. Grillo F, Izzo C, Mazzotti G, Murador E. Improved method for determination of high-density-lipoprotein cholesterol II. Enzymic determination of cholesterol in high-density lipoprotein fractions with a sensitive reagent. *Clin Chem*. 1981;27(3):375–9.
15. Okada M, Matsui H, Ito Y, Fujiwara A, Inano K. Low density lipoprotein cholesterol can be chemically measured. *J Lab Clin Med*. 1998;132(3):195–201.
16. Liao C, Gao W, Cao W, Lv J, Yu C, Wang S, et al. 2016.
17. Tolstrup JS, Halkjær J, Heitmann BL, Tjønneland AM, Overvad K, Sørensen TI. Alcohol drinking frequency in relation to subsequent changes in waist circumference. *Am J Clin Nutrition*. 2008;87(4):957–63.
18. Marmot MG, Elliott P, Shipley MJ, Dyer AR, Ueshima HU, Beevers DG, et al. Alcohol and blood pressure: the INTERSALT study. *BMJ*. 1994;308(6939):1263–7.
19. Groppelli A, Giorgi DM, Omboni S, Parati G, Mancia G. Persistent blood pressure increase induced by heavy smoking. *J Hypertens*. 1992;10(5):495–9.
20. Li XX, Zhao Y, Huang LX, Xu HX, Liu XY, Yang JJ, et al. Effects of smoking and alcohol consumption on lipid profile in male adults in northwest rural China. *Public Health*. 2018;157:7–13.
21. Klop B, Rego AT, Cabezas MC. Alcohol and plasma triglycerides. Current opinion in lipidology. *Curr Opin Lipidol*. 2013;24(4):321–6.
22. Mammas IN, Bertsias GK, Linardakis M, Tzanakis NE, Labadarios DN, Kafatos AG. Cigarette smoking, alcohol consumption, and serum lipid profile among medical students in Greece. *Eur J Public Health*. 2003;13(3):278–82.
23. Slagter SN, Van Vliet-Ostaptchouk J, Vonk JM, Boezen HM, Dullaart RP, Kobold AC, et al. Combined effects of smoking and alcohol on metabolic syndrome: the LifeLines cohort study. *PloS one*. 2014;9(4):e96406.
24. Jung CH, Park JS, Lee WY, Kim SW. Effects of smoking, alcohol, exercise, level of education, and family history on the metabolic syndrome in Korean adults. *Korean J Med*. 2002;63(6):649–59.

Author biography

Mingma Lhamu Sherpa, Professor

Birendra Kumar Jha, Assistant Professor

Jitendra Kumar Singh, Associate Professor

Binod Kumar Dahal, Professor

Chamma Gupta, Ph.D. Scholar

Cite this article: Sherpa ML, Jha BK, Singh JK, Dahal BK, Gupta C. Physiological and biochemical parameters of smokers and alcohol consuming adults from Terai region of Nepal using cross-sectional study. *Int J Clin Biochem Res* 2022;9(3):224-228.