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Research Article

A Comparison of Insulin Sensitivity and Lipid Profile in Tobacco Chewers and Non-Tobacco Chewers Participants

Karan Dhariya[1] Manila Jain[2], Sunil Kumar[3]
[1,2,3]PhD. Scholar, Malwanchal University, Indore, M.P.
Corresponding Author- Karan Dhariya
PhD. Scholar, Malwanchal University, Indore, M.P.
Email: ks605817@gmail.com
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ABSTRACT
Background: Tobacco chewing is a prevalent habit in many populations and has been implicated in metabolic disturbances, including insulin resistance and dyslipidemia. This study aimed to compare insulin sensitivity and lipid profile parameters between tobacco chewers and non-tobacco chewers.
Methods: A cross-sectional study was conducted among 100 participants, divided into two groups: 50 regular tobacco chewers and 50 age- and sex-matched non-tobacco chewers. Fasting blood glucose, fasting serum insulin, and lipid profile parameters (total cholesterol, triglycerides, low-density lipoprotein [LDL], and high-density lipoprotein [HDL]) were measured. Insulin resistance was assessed using the Homeostatic Model Assessment for Insulin Resistance (HOMA-IR). Statistical analysis was performed using independent t-test, with $p < 0.05$ considered significant.
Results: Tobacco chewers showed significantly higher fasting blood glucose (110 ± 13 mg/dL in tobacco chewers. 93 ± 11mg/dL, $p < 0.01$) in non-tobacco chewers, fasting insulin levels (19.5 ± 4.5 µIU/mL vs. 11.5 ± 2.9 µIU/mL, $p < 0.01$), and HOMA-IR values (4.3 ± 1.1 vs. 2.6 ± 0.7, $p < 0.001$) compared to non-chewers. Lipid profile analysis revealed significantly elevated total cholesterol (212.5 ± 27 mg/dL vs. 171.20 ± 20.7 mg/dL), triglycerides (181. ± 30 mg/dL vs. 129.3 ± 25 mg/dL), and LDL (128 ± 17 mg/dL vs. 105.4 ± 14 mg/dL), along with reduced HDL levels (38 ± 5 mg/dL vs. 58.9 ± 6 mg/dL) in tobacco chewers ($p < 0.05$ for all).
Conclusion: Tobacco chewing is significantly associated with reduced insulin sensitivity and an adverse lipid profile. These findings highlight the increased risk of metabolic disorders, including type 2 diabetes mellitus and cardiovascular disease, among tobacco users. Preventive strategies and awareness programs are essential to reduce tobacco consumption and its associated metabolic risks.

Keywords: Tobacco Chewing, Insulin Resistance, Lipid Profile, HOMA-IR, Dyslipidemia.

INTRODUCTION

The burden of non-communicable diseases is greatly increased by tobacco use, a serious worldwide health concern. Tobacco use is still common and affects millions of people globally, despite several public health measures aiming at lowering its prevalence. Although, the harmful effects of smoking on cardiovascular and respiratory health are widely known, concerns regarding the effects of smoking and smokeless tobacco products on metabolic health are also becoming more prevalent.[1,2]

Many tobacco chewers are dying from serious illnesses like heart and lung conditions, mouth cancer, and other conditions. Chewing tobacco is the most popular way to consume tobacco. According to research, chewing tobacco is a common habit among youths over 25 year of age. Two-thirds of men chew tobacco in India, according to National Family Health Survey (NHFS) conducted in 2015–16. State-specific rates of chewing tobacco ranged from 15-45% among men [3,4].

It is more prevalent among rural, underprivileged, and less educated people. Due to the fact that nicotine induces IR, those who use it have a higher risk of developing diabetes. Nicotine use is closely linked to the level of IR and the severity of accompanying metabolic problems. [5,6]

The amount of long-term nicotine usage measured by the plasma nicotine level was found to be strongly and negatively correlated with the degree of insulin sensitivity. There aren't many studies on the immediate effects of smoking cessation on glucose metabolism. Using the euglycemichyperinsulinemic clamp approach, Epifanoet al. [7,8]

MATERIAL AND METHOD

The present cross-sectional comparative study was conducted in the Department of Physiology at Index Medical College, Indore, MP. The subjects were selected from the OPD of Index Medical College, Indore. A total sample size of 100 subjects was included in the study, with the age of participants ranging from 30 to 60 years. The subjects were then divided into two groups: Group A and Group B. Group A consisted of 50 subjects who were tobacco chewers, while Group B consisted of 50 subjects who did not chew any form of tobacco.

InclusionCriteriaForGroupA

1. Malesaged30–60 years. 2. Regularchewers inform oftobacco(e.g.,gutkha, khaini,zarda)for≥1 years. 3. Willingtogiveinformedconsent·4. No history of tobacco use in form of smoking.Should be free from any kind of diseases.

ExclusionCriteria(BothGroups)

Subject having age <30 and>60years.

Subject having any kind of disease will be excluded from study. Alcoholconsumptionor smokingOnmedicationsaffectinglipidmetabolism orinsulinsensitivity(e.g.,statins,metformin)Anya cuteillnessat thetimeofsampling

Data Collection

After obtaining informed consent, detailed history was taken including age, dietary habits, physical activity, and duration/frequency of tobacco chewing.

METHODOLOGY

Biochemical Analysis[9, 10]

- Fasting Blood Glucose (FBG)
- Fasting Serum Insulin
- Lipid Profile:
- Total Cholesterol
- Triglycerides
- HDL-C
- LDL-C

Calculation of Insulin Resistance

HOMA-IR = (Fasting Insulin × Fasting Glucose) / 405

Statistical Analysis

- Data expressed as mean ± SD
- Independent t-test used for comparison
- $p < 0.05$ considered statistically significant

RESULT

Table-1: Gender Distribution (30–60 Years

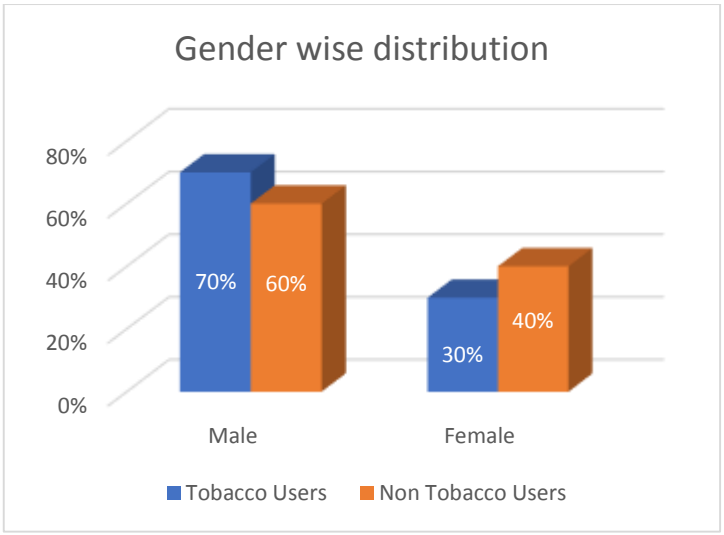
Gender	Tobacco Chewers (n=50)	Non-Tobacco Chewers (n=50)	Total (n=100)
Male	35 (70%)	30 (60%)	65 (65%)
Female	15 (30%)	20 (40%)	35 (35%)
Total	50 (100%)	50 (100%)	100 (100%)

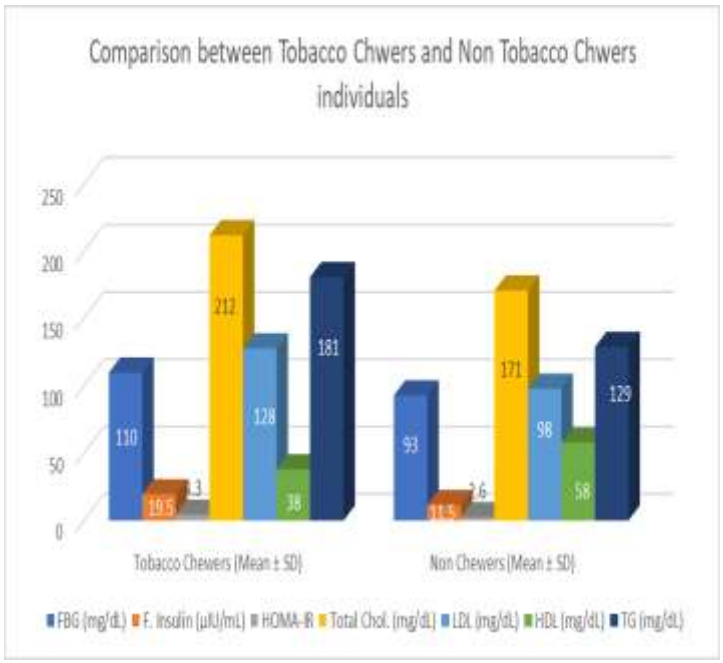
Table 1 shows the gender-wise distribution of study participants among tobacco chewers and non-tobacco chewers. Out of the total 100 participants, 65% were males & 35% were females, indicating males are in majority in the study population.In the tobacco chewers group, males constituted 70% (n=35), while females accounted for 30% (n=15). In contrast, the non-tobacco chewers group had 60% males (n=30) and 40% females (n=20)

Table-2

Parameter	Tobacco Chewers (Mean ± SD)	Non-Chewers (Mean ± SD)	p-value
FBG (mg/dL)	110 ± 13	93 ± 11	<0.05
F. Insulin (µIU/mL)	19.5 ± 4.5	11.5 ± 2.9	<0.001
HOMA-IR	4.3 ± 1.1	2.6 ± 0.7	<0.001
Total Chol. (mg/dL)	212 ± 27	171 ± 20	<0.05
LDL (mg/dL)	128 ± 17	105 ± 14	<0.05
HDL (mg/dL)	38 ± 5	58 ± 6	<0.01
TG (mg/dL)	181 ± 30	129 ± 25	<0.05

The table 2 shows that tobacco chewers have significantly higher fasting blood glucose, fasting insulin, and HOMA-IR values compared to non-chewers, indicating reduced insulin sensitivity. Additionally, tobacco chewers exhibit an unfavorable lipid profile, with higher total cholesterol, LDL, and triglyceride levels, along with lower HDL levels. All differences are statistically significant, suggesting that tobacco chewing is associated with increased metabolic and cardiovascular risk.





DISCUSSION

The present study demonstrates a significant association between tobacco chewing and reduced insulin sensitivity, as indicated by elevated HOMA-IR values. Nicotine is known to induce insulin resistance by increasing catecholamine release and oxidative stress.

The lipid profile findings suggest dyslipidaemia among tobacco chewers, characterized by elevated LDL and triglycerides and reduced HDL levels. These changes may increase the risk of atherosclerosis and cardiovascular disease.

Similar findings have been reported in previous studies, indicating that smokeless tobacco is not a safe alternative to smoking.

Longitudinal studies to assess biomarkers for recurrence surveillance and treatment response are needed. Artificial intelligence-driven predictive models may identify high-risk individuals for targeted screening. Collaboration between researchers, clinicians, industry partners, and regulatory agencies will accelerate translation from bench to bedside[11].

CONCLUSION

Tobacco chewing adversely affects insulin sensitivity and lipid metabolism. Public health interventions should focus on reducing smokeless tobacco use to prevent metabolic and cardiovascular complications.

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