Journal of Saidu Medical College 2012; 2 (2)

COMPARISON OF TOTAL LEUCOCYTE AND EOSINOPHIL COUNT IN MALE SMOKERS AND HEROIN ADDICTS IN PESHAWAR

Mohammad Tariq[1], Riffat Sultana[2], Riaz Gul[3], Rashid Mehmood[4]

1. Department of Physiology, Kabir Medical College, Peshawar.
2. Department of Physiology, Khyber Girls Medical College Peshawar, Pakistan.
3. Department of Community Medicine, Kabir Medical College Peshawar.
4. Department of Community Medicine, Kabir Medical College Peshawar.

ABSTRACT

Background: The harmful components of tobacco smoke nicotine, tar and carbon monoxide affects different haematological parameters. Heroin affects almost every system of the body including blood and its components. The present study was conducted in Physiology department; Khyber Medical College Peshawar from Jan 2006 to Dec 2007. The objective of the present study was to compare the affects of cigarette smoking and heroin abuse on haematological parameters especially total leukocyte count and eosinophil count.

Subject and Methods: The study was conducted on hundred age and sex matched subjects. The subjects were divided into three groups i.e. forty cigarette smokers and forty heroin addicts and with twenty normal (Control). Laboratory tests were performed at Pakistan Medical Research Council (P.M.R.C) Khyber Medical College, Peshawar. Data was statistically analysed by computer using SPSS 10 software.

Results: Total leukocyte and eosinophil counts were raised in both cigarette smokers and heroin abusers as compared to normal individuals. Total Leukocyte count (TLC) was found significantly higher ($P<0.001$) in cigarette smokers as compared to heroin addicts whereas there was no statistically significant difference in eosinophil count of cigarette smokers and heroin addicts. Neutrophil and lymphocyte percentages were lower and monocyte percentage higher in both cigarette smokers and heroin addicts as compared to control group.

Conclusion:

Haematological parameters vary with cigarette smoking and heroin abuse. Therefore history of smoking and heroin abuse should be considered while interpreting the investigation in such patients.

Key words: Leukocyte count, Eosinophil, Heroin addiction, Smoking.

INTRODUCTION

Tobacco is used worldwide in various forms and its introduction to any country is associated with immense health problems and its prevalence is constantly rising in the developing countries[1]. According to the survey in 1980 among 1600 adults aged 20 and above in Karachi, 27.4% of males smoked, as did 4.4% of females[2]. Pakistan has a long history of poppy and cannabis cultivation but was not threatened by the onslaught of drugs until the end of 1970s[3]. Different types of drugs are abused in Pakistan for various reasons like personal necessity, medical needs, psychological problems, social customs etc. Traditional drugs of cannabis(Bhang and Charas), opium and alcohol have been used in Pakistan[4]. But there was dramatic change in drug use pattern in the beginning of eighties with introduction of heroin[5].Heroin was introduced in Pakistan in 1980 and is now the most common drug of abuse in Pakistan[5]. Survey was conducted by Pakistan Narcotics control Division in 1980 that shows that the total drug users are 2.24 million which shows that despite of all efforts to control the drug abuse problem, it is increasing day by day[4]. Heroin remained the most popular drug, being abused by 51% or 1.52 million people, 71.5% of drug abusers are under 35years of age with maximum prevalence (43%) in the 26-35 years age group[6].

Smoking being regarded as socially attractive but it is more hazardous to human health. Tobacco products are estimated to have caused 3 million deaths per year in the early 1990s and the death toll is steadily increasing and the figure is expected to rise to 10 million deaths per year by 2010s or early 2030s,with 70% of those occurring in developing countries[7].Smoking is responsible for 90% of lung cancer and 10% of cancers of tongue, larynx, oral cavity, oesophagus, pancreas and urinary bladder[8]. Smoking also effects the various haematological parameters including haemoglobin concentration, erythrocyte count, haematocrit value, mean corpuscular volume, mean corpuscular haemoglobin concentration, total leukocyte count and differential leukocyte count[9]. Conflicting results have been reported regarding eosinophil count. Some studies have reported increase in eosinophil count in cigarette smokers[9,10]. On the other hand some studies have claimed a decrease in eosinophil count with cigarette smoking[11,12]. Differential leukocyte count is not much affected by heroin abuse[13]. Another study has shown a positive correlation between heroin abuse and high eosinophil count[14]. This study was designed to address the controversy existing on the basis of studies so far conducted on the subject, especially with regard to effects on eosinophil count in smokers. We also wanted to evaluate whether the total leukocyte count and eosinophil count rise to the same extent in tobacco smokers and heroin addicts or the rise in the total leukocyte count and eosinophil counts in heroin addicts is greater than the rise in the total leukocyte count and eosinophil count in tobacco smokers.

MATERIALS AND METHODS

The study was conducted on forty smokers and forty heroin addicts and twenty healthy control. Hundred male subjects ageing 26 to 35 years and having no apparent physical illness were included in the study. The subjects were divided in to three groups i.e. Group A normal (Control), group B cigarette smokers and group C heroin addicts. Subjects having acute infections, atopic or allergy and worm infestations were excluded. Acute infections were ruled out by history, clinical examination and laboratory investigations. The results were compared with twenty ages and sex matched normal controls that had never smoked or used heroin or any other substance of abuse.

Normal controls and smokers were chosen from the general population while heroin addicts were active addicts living in streets and used to visit the "Drop In"centres of Dost Foundation, Hayatabad, and Peshawar.

Those cigarette smokers were included who were smoking at least 15-20 cigarettes per day for a minimum period of one year. Heroin addicts included in the study were abusing heroin for a minimum period of one year. Those heroin addicts were included in the study whose urine Thin Layer Chromatography was positive for morphine[5]. Commercial chromatography strips by Acon Laboratories, United States of America were used. After detailed medical history and through clinical examination excluding any apparent physical illness, blood and urine samples from consented subjects in all groups of this study were obtained between 9:00 to 11.00 A.M to reduce the influence of circadian variation. Clean glass bottles were given to the subjects for stool sample. The blood was drawn by venipuncture method from the cubical vein using properly sterilized disposable syringes. Blood was then transferred to clean test tubes containing EDTA (Ethylene Diamine Tetra-acitic Acid) to avoid coagulation of blood.

Midstream urine samples were collected in clean glass bottles. The samples were then taken to research centre of P.M.R.C (Pakistan Medical Research Council) at Khyber Medical College, Peshawar where the samples were analysed for the required parameters. The data was tabulated by computer using Microsoft Excel. Data was statistically analysed by computer using SPSS 10 software.

RESULTS

Our study shows a significant increase in total leukocyte count in cigarette smokers as compared to normal individuals ($P< 0.001$) as seen in table 1,

figure1.The neutrophil and lymphocyte percentage were lower in cigarette smokers and heroin addicts compared with control group. There was no significant change in the neutrophil and lymphocyte percentages of cigarette smokers and heroin addicts when compared with each other. An increase in percentage of monocytes was observed in both cigarette smokers and heroin addicts when compared with control subjects. The eosinophil percentage and total eosinophil count was higher in cigarette smokers as compared to normal individuals. The rise was statistically significant (P <0.001). The percentages of different types of leukocytes were also compared among the three groups. The percentage of neutrophils was found lower in both cigarette smokers and heroin addicts as compared to control group as seen in table 2. The percentage of lymphocytes was also found lower in group B and C as compared to group A. Whereas the percentages of monocytes and eosinophils was significantly raised in cigarette smokers and heroin addicts as compared to normal subjects. The increase in eosinophil count does not vary significantly in cigarette smokers as compared to heroin addicts as given in table 3, figure 2.

The mean value of total leukocyte count (TLC) was higher in both cigarette smokers and heroin addicts as compared control group. The increase in TLC of cigarette smokers was significantly higher than that of heroin addicts as shown in table.

The average value of absolute eosinophil count is increased in both cigarette smokers and heroin addicts as compared to normal subjects. The increase in eosinophil count does not vary significantly in cigarette smokers as compared to heroin addicts.

Our study shows a significant increase in total leukocyte count in cigarette smokers as compared to normal individuals (P<0.001). The eosinophil percentage and total eosinophil count was higher in cigarette smokers as compared to normal individuals. The rise was statistically significant (P<0.001).

TABLE 1:
MEAN VALUES OF TOTAL LEUKOCYTE COUNT OF GROUP A, B AND C.

Group	Total Leukocyte Count Cells/cmm	
	Range	Mean ± SD
Control 'A'	5000 - 7100	6615 ± 501.87
Smokers 'B'	8000 - 10300	9071.25 ± 543.72
Heroin Addicts 'C'	7800 - 9300	8347.50 ± 514.76
A Vs B	P < 0.001	
A Vs C	P < 0.001	
B Vs B	P < 0.001	

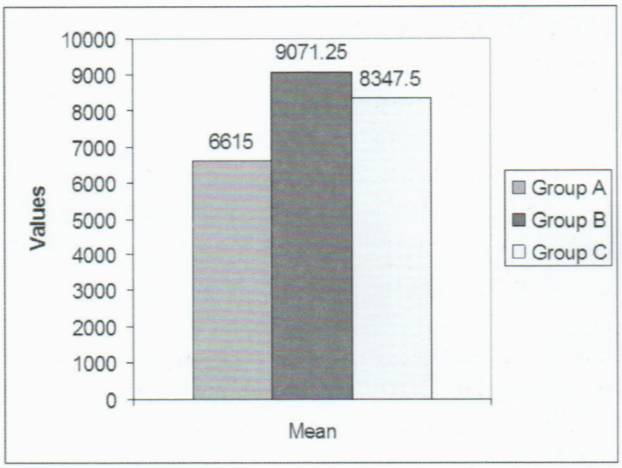


Figure 1: Mean values of total Leukocyte count of Group A,B and C.

TABLE 2: MEAN VALUES OF NEUTROPHIL, LYMPHOCYTE, MONOCYTE AND EOSINOPHIL PERCENTAGES OF GROUP A, B AND C.

Group	Neutrophil % Mean ± SD	Lymphocyte % Mean ± SD	Monocyte % Mean ± SD	Eosinophil % mean ± SD
Control A	63.5 ± 2.7	32.45 ± 2.52	1.65 ± 0.59	2.1 ± 0.31
Cigarette Smokers B	59.43 ± 1.47	30.55 ± 1.40	2.3 ± 0.79	7.68 ± 1.31
Heroin addicts C	58.8 ± 1.88	30.70 ± 2.04	3.1 ± 0.78	7.60 ± 2.57
A Vs B	P < 0.001	P < 0.001	P = 0.001	P < 0.001
A Vs C	P < 0.001	P = 0.001	P < 0.001	P < 0.001
B Vs C	NS*	NS	P< 0.001	NS

* Not Significant

TABLE 3: MEAN VALUES OF EOSINOPHIL COUNT OF GROUP A, B AND C.

Group	Total Leukocyte Count Cells/cmm	
	Range	Mean ± SD
Control 'A'	120 195	138.05 ± 15.30
Smokers 'B'	415 1133	702.33 ± 160.19
Heroin Addicts 'C'	390 1170	646.10 ± 257.99
A Vs B	P < 0.001	
A Vs C	P < 0.001	
B Vs B	Not Significant	

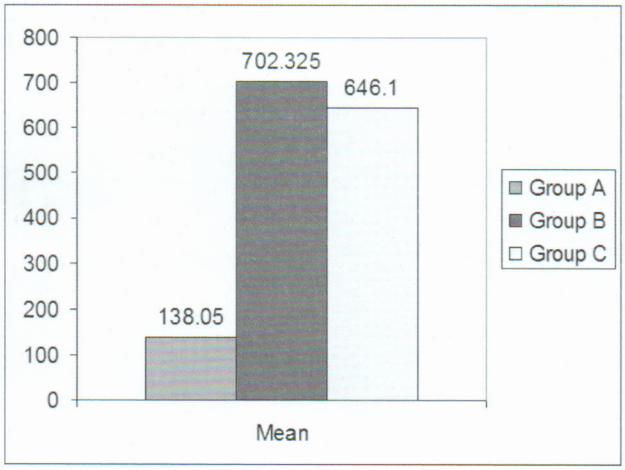


Figure 2: Mean values of Eosinophil count of Group A,B and C.

DISCUSSION

Tobacco is used worldwide in various forms and its introduction to any country is associated with immense health problems and its prevalence is constantly rising in the developing countries[1]. Heroin was introduced in Pakistan in 1980 and is now the most commonly abused drug[5]. Heroin abuse has affects on the body including blood and its components[15]. The present study was aimed to compare the effects of cigarette smoking and heroin abuse on various haematological parameters particularly total leukocyte count and eosinophil count.

Our study shows a significant increase in total leukocyte count in cigarette smokers as compared to normal individuals (P<0.001).Our finding are in consistence with previous studies[16,17]. Different workers have suggested different mechanism for the increased total leukocyte count in cigarette smokers. Some authors have suggested that smoking induced airway inflammation is the major cause of the observed leukocytosis[18,19]. Others have suggested it as likely that the increase in total leukocyte counts in cigarette smokers is directly due to smoking i,e. Nicotine releases catecholamine that can raise the leukocyte count[19,20]. Possibly smoking decreases the ability of leukocytes to adhere to endothelial cells lining blood vessels ,resulting in a high blood cell count[13]. ZebJ,et al.(1995) has reported an increase in total leukocyte count in heroin addicts[13]. Our observation is in agreement with previous work showing a significant rise in total leukocyte count in heroin abusers as compared to normal subjects (P<0.001).Leukocytosis is observed in heroin addicts even in the absence of infections[13]. The increase in total leukocyte count in heroin addicts may be due to heroin inhalation being irritant effect of smoke on respiratory tract with resultant inflammation. In our result the mean value of total leukocyte count in cigarette smokers was high as compared to heroin addicts(P<0.001). This may be because of the possible effect of nicotine releasing catecholamines and increasing the total leukocyte count added with the irritant effect of smoke.

The eosinophil percentage and total eosinophil count was higher in cigarette smokers as compared to normal individuals. The rise was statistically significant (P<0.001). A number of studies have shown similar increase in eosinophil count in cigarette smokers[9,10,20,21]. This is probably due to an allergenic effect of some components of tobacco smoke as Tar.

Charuvastra V,EhrmannM(1975) have observed a high eosinophil count in heroin addicts[14]. A higher eosinophil percentage and total eosinophil count were also observed in the present study (P<0.001)

which is in agreements with the previous work[22]. The rise in eosinophil count in heroin may be due to the allergenic effects of some of the impurities like talc, washing powder, strychnine, cyanide etc, which are mixed in heroin in order to earn more money.

CONCLUSION & RECOMMENDATIONS

Haematological parameters vary with cigarette smoking and heroin abuse. Therefore history of smoking and heroin abuse should be considered while interpreting the investigation in such patients.

Cigarette smoking is associated with large number of health problems. Prevalence of smoking is consistently rising in developing countries. It is recommended that:

Government should give incentives to the farmers so that they cultivate other crops instead of tobacco.

Cigarette advertisements should be banned on media particularly television and especially in primetime.

Tobacco smoking is the largest source of indoor pollution. The government has taken a very praiseworthy step by banning smoking at all public places but its implication is yet far from reality. This should be very strictly implemented.

Governmental and nongovernmental organisation should arrange workshops and public awareness programs to educate masses regarding hazards of heroin addiction and cigarette smoking.

REFERENCES

1. Ahmed Z,Habib U,Kafeel M,KhanMH. Blood parameters and smoking pattern in Peshawar colleges. Pak JMed Res 1995;34(3);190-3.
2. WHOTobacco or health: A global status report. World Health Organisation, Geneva 1997;1,7 and 256-8.
3. National Survey on Drug Abuse. Narcotic Control Division 1993.
4. Tahir M. Psychological characteristics of drug addicts and non addicts UN published PhD thesis 1996 University of Peshawar.
5. Rashid A and Tareen IAK. Thyroid function, cortisol and testosterone levels in heroin addicts. Pak Jour Med Resear 1994;33(1):50-2.
6. National Survey on Drug Abuse, Pakistan Narcotic Control Divion,1993.
7. WHO Tobacco or health; A global status report. World Health Organisation Genava 1997;1.7 and 256-8.
8. Doll R and PetroR; The causes of cancer. Oxford, Oxford University Press 1981.
9. Jensen EJ, PedersenB ,FrederikenR, DahlR. Prospective study on the effect of smoking and nicotine substitution on leukocyte blood counts and relation between leukocytes and lung function. Thorax 1998 Sep:53(9);784-9.
10. Lams BE, Sousa AR, Rees PJ and Lee TH. Immunopathology of the small airway submucosa in smokers with and without chronic obstructive pulmonary disease. Am J RespirCrit Care Med 1998 Nov; 158(5): 1518-23.
11. Winkle P, and Statland BE. The acute effect of cigarette smoking on the concentration of blood leukocyte types in healthy young women. Am J ClinPatho 1981 June: 75(6): 781-5.
12. Schwartz J and Weiss ST. Cigarette smoking and peripheral blood leukocyte differentials. Am J Epidemiol 1994 May; 4(3): 236-42.
13. Zeb J.Tayyab M,Khan H,Qureshi SA. Basic haematological derangements in heroin addicts. Pak J Med Res 1995;34(3):194-5.
14. Charuvastra V and Ehrmann Six months follow up of eosinophils counts in heroin addicts Ann Allergy 1975 Jan;34(1);15-8.
15. Parry H,CohenS,Schlarb JE. Smoking, alcohol consumption and leukocyte count.AmJclinPathol 1997; 107:64-7.
16. Inoue O, Seiji K, Takahashi M et al. Subtle increase in leukocyte count in association with drinking and smoking habits. Int Arch

Occup Environ Health 1995; 66(6): 383-8.
17. Whitehead TP, Robinson D, Allaway SL and Hale AC. The effects of cigarette smoking and alcohol consumption on blood haemoglobin, erythrocytes and leukocytes: a dose related study on male subjects. Clin Lab Haematol 1995 June; 17(2): 131-8.
18. Sparrow D, GlynnRJ, Cohen Mand Weiss ST. The relationship of peripheral leukocyte count and cigarette smoking in pulmonary function among adult males Chest 1984; 86:383-6.
19. Sher A, Kamal A and Aziz S. A correlation between various spirometric variables and peripheral leukocyte count. Jour Pak Med Assoc 1988 May; 132-4.
20. Taylor RG. Smoking and leukocyte count. Eur J Respir Dis 1987 Aug; 71(2): 65-8.
21. Ulrik CS. Eosinophils and pulmonary function: an epidemiological study of adolescents and yung adults. Ann Allergy Asthma Immunol 1998 June; 80(6): 487-93.
22. Christopher JF,Barry K and Gerald JG.Eosinophils, Immunology Today 1992;13(10):384-7.

Correspondence :
Dr. Tariq
Professor & Head,
Department of Physiology,
Kabir Medical College,
Canal Road, Academy Town,
Peshawar, Pakistan.
E-mail: physiologist72@yahoo.com
Cell: 03339226345