

## Opinion Article

# The need for blood alcohol concentration (BAC) legislation in Nigeria

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## Abstract

*In Nigeria, the correlation between alcohol abuse and incidence of drink-driving and alcohol-related motor task and road trauma has been recognised. Unrestricted availability of alcohol and ignorance, coupled with the absence of Blood Alcohol Concentration (BAC) threshold to act as a legal reference point for controlling the use, misuse or abuse of alcohol in Nigeria, are major concern. The pharmacology, clinical and sports implications of indulgence in alcohol and the debate on its legal status are highlighted in this article. The information presented could offer both clinical and safety benefits to psychomotor tasks executors and road safety professionals.*

**Key words:** *Blood alcohol concentration (BAC), legislation, road safety*

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## **Introduction**

Safety has always been one of the most important human concerns. It is the concern for safety, reducing health care costs and taking more control of one's health that often necessitate countries to legislate against certain human practices or behaviors. The upsurge in drug-related problems worldwide has witnessed an ever-increasing trend toward the misuse and abuse of alcohol. It is difficult to know the actual statistics of alcohol use, misuse or abuse in Nigeria, in particular and worldwide in general. However, it is estimated that alcohol-related deaths in many countries of the world may run as high as tens of thousands per year. Moreover, alcohol may contribute to over 50 percent of traffic and occupational accidents in such countries, and may cause numerous fatalities, countless injuries, and immeasurable property damage each year. The cost of most national alcoholic problems is therefore better imagined than estimated.

The volume of essay on these and related issues notwithstanding, many Africa seems totally left out of the research and legislation on blood alcohol concentration (BAC). Except for South Africa and Zimbabwe, no other African country, including Nigeria, has any visible research or legislation on BAC. It is this lapse being witnessed in Nigeria that justifies the need for this article.

## **Existing road traffic legislations in Nigeria and justification for BAC**

Epidemiological evidence linking alcohol and transportation accidents is supported by experimental studies of alcohol's effect on specific driving related skills. These skills may be divided into cognitive skills, such as information processing, and psychomotor skills (those involving eye, brain-hand coordination). Impairment is related to alcohol in terms of its concentration in the blood streams, (NIAAA)<sup>1</sup>. At present, there is no documented experimental work published in Nigeria that is linking the level of blood

alcohol concentration with impaired driving, thus creating room for defective legislation and speculations.

The various traffic laws existing in Nigeria presently are a response to the need to reduce road accidents and promote road safety. The Road Traffic Act, Federal Highway Act, and the Federal Road Safety Commission Decree are legislations that presently apply to Federal highways. Each State in Nigeria has its own law applicable to public roads (including Highways within its boundaries) within the State. In addition, highway code also exists. It is worthy of note that scientists have contributed to the establishment of BAC limits with data from experimental and epidemiological studies to identify the alcohol levels which produce driving skills impairment and increased crash rates.

In Nigeria, the traffic laws confer wide powers on the Federal Road Safety Corpse (FRSC)<sup>2</sup>. Decree No. 45 setting up the FRSC Commission does not only give members of the FRSC power to arrest and prosecute traffic offenders, but also gives the Commission power to make regulations concerning road safety matters. Usually, accidents don't just happen, they are caused. So the main object of traffic laws has been to ensure that "the right person drives the right vehicle in the right manners." To achieve this main objective, the various traffic laws have created many offences attracting various legal sanctions. Drunken – driving is among the major offences under the road traffic laws.

The closest law on drinking in Nigeria is based on CAP 148 (Traffic Code Law)<sup>3</sup> section 27(1) which states thus:

Any person who when driving or attempting to drive or when in charge of a motor vehicle on a highway is under the influence of drink or drunk to an extent as to be incapable of having proper control of such vehicle, shall be liable...

The interpretation of this law is a call to anarchy, which implies that there is no scientific bench mark to assess level of impairment.

The questions that agitate ones mind are: How does a member of FRSC or any other relevant agency dictate or determine an individual **under the influence** of alcohol? What level of the alcohol content constitutes an offence?

The likelihood of incapability of proper control can manifest by accident with resultant morbidity and mortality. It is against this background that experts believe that there is need for specifying the level of BAC before an individual is declared intoxicated. There is worldwide agreement that alcohol involved-drinking is curtailed when BAC laws are enacted and enforced. The overriding consideration Worldwide for BAC legislation is purely on safety based on several clinical findings with minimal social and cultural (e.g. religious) considerations.

### **The Imperativeness of BAC Legislation in Nigeria**

Various BAC standards in some countries of the world are given in Table 1. Unpublished data from Save Accident Victims Association of Nigeria (SAVAN, 2003)<sup>4</sup> show that out of 3,850 cases handled at various centres, as much as 1,780 (46.3%) victims had evidence of alcohol as at the time of accident ascertained with the use of digital breath alcohol analyzer. Lack of comprehensive screening tools for BAC makes these data controversial with bias to underreporting.

An international survey of BAC is quite revealing. While many countries have legislated maximum permissible BAC levels, the threshold at which a country draws its line varies considerably. Table 1 shows that the threshold for the maximum allowable BAC for drivers ranges from a level of 1.0 mg/ml to a level of zero tolerance (0.0 mg/ml).

Girdans & Durek<sup>5</sup> revealed that at 0.15 percent a driver would be considered legally intoxicated in all states of the United States in accordance with the original criterion set up by the National Safety council. However, this agency more recently advocated a legal intoxication level of 0.01 percent and virtually all states have complied. Utah has the lowest minimum BAC (0.08 percent)<sup>5</sup>. It may be argued that the US has the highest permissible BAC level.

It should be observed that out of the 53 countries shown in Table 1, 8 countries set their BAC at zero level; only Albania and United States agreed on 0.1 mg/ml as the legislated BAC. As many as 27 countries set theirs at 0.5 mg/ml while Sweden and Norway put theirs at 0.2 mg/ml level. A total of 10 countries set their BAC level at 0.8 mg/ml while only 3 countries acknowledge 0.3 mg/ml level. Lithuania is the only country that sets hers at 0.4 whereas Russia vaguely puts hers as 'drunkenness'. It should be noted that South Africa and Zimbabwe are the only African countries that have determined their BAC level. Nigeria is conspicuously lacking in this vital life-style control prohibition standard.

It is regrettable that the rate at which accidents, especially traffic ones, take place in Nigeria is not only alarming but also catastrophic. Everyday many people are either injured or die as a result of motor vehicle or motorcycle accidents on our roads. Moreover, goods worth thousands of Naira are lost following such accidents. Accidents are unplanned or unexpected happenings which are attributable to various factors, which Agwubike<sup>6</sup> outlined as:

- i. Institutional,
- ii. Mechanical,
- iii. Individual or human,
- iv. Societal, and
- v. Environmental

Drunkenness and use of drugs have been identified as the major human factors that

**Table 1:** Worldwide distribution of blood alcohol concentration (BAC) standards

Country	Standard BAC (mg/ml)	Country	Standard BAC (mg/ml)
Albania	0.1	Lithuania	0.4
Argentina	0.5	Luxembourg	0.8
Armenia	0	Malta	0.8
Australia	0.5	Moldova	0.3
Austria	0.5	The Netherlands	0.5
Azerbaijan	0	New Zealand	0.8
Belarus	0.5	Norway	0.2
Belgium	0.5	Peru	0.5
Bosnia and Herzegovina	0.5	Poland	0.5
Bulgaria	0.5	Portugal	0.5
Canada	0.8	Romania	0
Croatia (Republic of)	0.5	Russia	"Drunkenness"
Czech Republic	0	Singapore	0.8
Denmark	0.5	Slovak Republic	0
Estonia	0	Slovenia	0.5
Finland	0.5	South Africa	0.5
France	0.5	South Korea	0.5
Georgia	0.3	Spain	0.5
Germany	0.5	Sweden	0.2
Greece	0.5	Switzerland	0.8
Hungary	0	Thailand	0.5
Iceland	0.5	Turkey	0.5
Ireland	0.8	Turkmenistan	0.3
Israel	0.5	United Kingdom	0.8
Italy	0.5	United States	0.8/1.0
Kyrgyzstan	0	Zimbabwe	0.8
Latvia	0.5	Nigeria	?

**Sources:** Adapted from: CBA Reports and work of Riley and Marshall (1999) and (2001)<sup>7,8</sup>.

cause road accidents in Nigeria<sup>6</sup> It is therefore well recognised that irresponsible drinking patterns, coupled with certain behavior such as driving, may bring about a range of harmful outcomes<sup>9</sup>. It is on this premise that countries agree on the need to establish regulations that prohibit impaired driving, particularly as it applies to the operation of automobiles on public roads. It is on record that the issue of drinking and driving first began to attract attention as populations and automobiles ownership increased in the late 19<sup>th</sup> and early 20<sup>th</sup> centuries<sup>10, 11</sup>.

In Nigeria, the influx of fairly used motor vehicles (popularly known in Nigeria as "Tokunbos") into the country has tremendously increased the number of such vehicles that ply our roads. Moreover, the popular use of motorcycles (popularly referred to as "Okadas" in Nigeria) as legal means of commercial transportation in the country has astronomically increased the

number of motorcycles in the country. The implication of these developments is that more people engage themselves in commercial bike/motor transport business. Moreover more drivers and riders indulge in drunk driving/riding in the bid to over work without feeling the stress as well as hustling to realize more income in there commercial transport business. Such individuals are usually involved in road traffic accidents. These call for legislation geared towards controlling human causative factors, particularly drunkenness and use of drugs. It is on this basis that road safety campaigns should emphasize standardizing BAC limits in Nigeria as well as designing practical modalities for enforcing such prohibition laws.

Standards in BAC are relative and have significance with respect to prohibition relating to manufacture, sale, and transportation of intoxicating liquors. Legislation will give power to legal authorities to penalize severely those who produce, sell,

transport, or even possess beverages containing as much as the stipulated percent alcohol. BAC standard therefore connotes establishing and maintaining quality or reference frames delimited in practical terms and based on the needs of the society concerned and the psycho-physiological implications. It must have well articulated and practical code of ethics for self-regulation.

An established BAC, therefore, serves both as a legal threshold above which offending drivers may be punished and as a reminder to individuals of the illegality of drink-driving. Although drink-driving is known to be a potentially dangerous behaviors, there is evidence that most Nigerians are neither aware of the legal limit which may apply to persons, nor of how much alcohol they may consume, before reaching the limit. There is therefore lack of both legal threshold for alcohol intoxication and public education campaigns in Nigeria to raise general awareness of local BAC limits which would have been an effective means of reducing drink-driving and associated harm. Scheinberg & Stouffer<sup>12</sup> as well as Bloomberg<sup>13</sup> had indicated that BAC legal limits campaigns implemented in a range of countries worldwide by government agencies and industrial bodies, including advocacy groups, such as Mothers Against Drunk Driving (MADD) had yielded reductions in the number of reported drink-driving trips and injurious or fatal accidents.

BAC legislation is therefore a priority that should invariably pertain to alcohol control for advantageous over all health and fitness promotion in contemporary Nigeria society. Hence, the setting of maximum allowable BAC level is a tool for enforcement and prevention of road traffic accidents that should be pursued with vigor in Nigeria. It is expected that legislation and enforcement of

BAC threshold in Nigeria will bring about reduced incidence of drink-driving and alcohol related road trauma.

### **Clinical Implications**

Stages of alcohol intoxication manifest in both psychological and physiological dimensions depicting the degree to which the central nervous system function is impaired. This is directly proportional to the concentration of alcohol in the blood.

As blood alcohol concentration increases, the person's response to stimuli decreases markedly, speech becomes slurred, and he or she becomes unsteady and has trouble walking. The American Medical Association has defined the blood alcohol concentration level of impairment for all people to be 0.04 g/100 ml of blood (equivalent to 0.04 g/210 L of breath)<sup>14</sup>. In the scientific literature, impairment refers to a statistically significant decrease in performance under alcohol treatment from the performance level exhibited under placebo treatment.

Abridged information from literature pertaining to the psycho-physiological effects of alcohol intoxication is presented in stages in Table 2.

A critical analysis of BAC threshold of many countries (Table 1) in relation to the clinical symptoms of the different stages of intoxication (Table 2) presents a bleak condition for those under the influence of alcohol engaging in psychomotor tasks. This is a matter of grave concern, at least from the clinical point of view. The alcohol BAC limit which has not been well quantified in Nigeria creates a more volatile accident-prone situation to motor vehicle drivers, or motorcycle riders or even sports performers.

**Table 2:** Stages of alcohol intoxication and the associated clinical or psycho-physiological effects

BAC (g/100 ml of blood or g/210 L of breath)	Stage	Clinical symptoms
0.01-0.05	Sub clinical	Behaviour nearly normal by ordinary observation
0.03-0.12	Euphoria	Mild euphoria, sociability, talkativeness, increased self-confidence; decreased inhibitions; diminution of attention, judgement and control; beginning of sensory-motor impairment; loss of efficiency in finer performance tests
0.09-0.25	Excitement	Emotional instability; loss of critical judgement Impairment of perception, memory and comprehension Decreased sensory response; increased reaction time Reduced visual acuity, peripheral vision and glare recovery Sensory-motor in-coordination; impaired balance; drowsiness.
0.18-0.30	Confusion	Disorientation, mental confusion; dizziness Exaggerated emotional states; disturbances of vision and of perception of colour, form, motion and dimensions; increased pain threshold Increased muscular in-coordination staggering gait, slurred speech; apathy, lethargy
0.25-0.40	Stupor	General inertia; approaching loss of motor functions; markedly decreased response to stimuli; markedly muscular in-coordination; inability to stand or walk; vomiting; incontinence; impaired consciousness; sleep or stupor
0.35-0.50	Coma	Complete unconsciousness; depressed or abolished reflexes; subnormal body temperature; incontinence; impairment of circulation and respiration possible death
0.45+	Death	Death from respiratory arrest

Adapted from: Girdans & Durek<sup>5</sup> *Drug Education Content and Methods*.

The risks of heavy drinking are reflected in Table 3.

It should be borne in mind that repeated excessive drinking will eventually damage all the indicated body parts in Table 3. Nevertheless, the major physiological effect of alcohol is vasodilatation of the surface areas, which means that the blood needed to transport oxygen and fuel materials to the muscles is being shunted to the skin. This has a detrimental effect on physiological type performances, but the most dramatic effect

of alcohol is on skill performance<sup>13</sup> However, alcohol is absorbed into the blood stream at different rates by different individuals, depending on total blood water content<sup>15</sup>, age, and gender differences<sup>16</sup>. Bradley and co-workers<sup>17</sup> asserted that women appear to be more susceptible than men to the medical complications of drinking. Bearing these factors and consequences in mind, the need to legislate the amount of allowable blood alcohol concentration in order to minimize drink – driving accidents becomes imperative

**Table 3:** Anato-physiological effects of alcohol on the Human body

Body part	Effect
Blood	Changes in red blood cells
Brain	Loss of memory; Confusion; Hallucination; Fits
Genitals	Impotence; Shrinking of testicles; Damage to unborn child (foetus)
Heart	High blood pressure; Irregular pulse; Enlarged heart
Intestines	Inflammation; Bleeding
Liver	Severe swelling and pain; Inflamed liver (hepatitis); Cirrhosis; Liver Cancer
Lungs	Infection including tuberculosis
Muscles	Weakness; Loss of muscle tissue
Nervous system	Tingling and loss of sensation in hands and feet
Pancreas	Painful inflammation
Skin	Flushing; Sweating; Bleeding
Stomach	Lining becomes inflamed; Bleeding; Ulcers

Source: Adapted from WHO / SA/ 92.4 <sup>18</sup>

### Sports Implications

It is not only automobile or motorized vehicle operators who are required to conform to certain BAC restrictions. The operators of other forms of recreational transport, such as bicycles, snow mobiles, and persons operating aircrafts may be held to similar standards. In many jurisdictions where a permissible drink – drive law is in force, it applies regardless of the type of motorized vehicle<sup>7</sup> In the realm of sports, alcohol consumption in an abusive form is carried over into our passion for sport competition. However, most athletes use alcohol for reasons apart from competition. Many athletes are under the impression that a few alcoholic drinks before a sport event can be strong ergogenic aid. Unfortunately, a system for determining BAC as ergogenics in athletes has not been evolved in Nigeria.

Nkowan and Jansen<sup>19</sup> cited alcohol as one of the psychoactive drugs being abused as ergogenic aids which has been available for traditional use in Africa for many years. Agwubike and co-workers<sup>20</sup> referred to ergogenic aids as food or non-food substances applied or taken by athletes to enhance physical performance. They are presumably people's search for the fountain of youth and the "easy", "quick", and "miraculous" route to enhance an excellent performance in sports. As an ergogenic aid, alcohol is proposed to:

- Calm the nerves
- Reduce inhibitions
- Increase mental alertness
- Reduce pain
- Increase confidence
- Reduce muscle tremor.

However, influencing these conditions appears to have a two-part response: an initial sensation of excitement followed by depressive psychomotor effects. It is on this note that Wilmore and Costil<sup>19</sup> revealed that alcohol:

- Decreases accuracy, balance, and reaction time
- Slows visual tracking and information processing
- Decreases strength, power and muscle endurance
- Dehydrates the body.

These adverse effects negate all the purported benefits thereby placing an athlete on alcohol influence to a greater risk of sustaining injury. It appears that alcohol produces the "feeling" of improved psychomotor skills, when in fact they are impaired while under the influence of even a very small amount of the drug<sup>21, 22</sup>. Kleiner<sup>23</sup> asserted that there is some evidence that alcohol may be able to reduce anxiety and muscle tremor, but the associated decrease in coordination, balance and information processing would negate any real benefit to

sports performance gained from the advantage in those areas. It should be noted that the depressive effect of alcohol does dull the sensation of pain, but pain indicates injury. The athlete on alcohol runs a greater risk of increasing the severity of an injury because without pain, they may be unaware of the extent of the damage. In addition, alcohol dehydrates the body by blocking the release of antidiuretic hormone, causing the kidneys to excrete excess body fluid in the form of urine<sup>19</sup>.

It should be remarked that drug testing in sports began at the 1968 Olympic games<sup>24</sup>. The International Olympic Committee (IOC) has instituted International Dope-Testing procedures involving very cautious sample collection and handling and the use of highly sophisticated equipment which has resulted in increasing detection of drug cheats. Agwubike outlined commonly used techniques in drug analysis for ergogenic effects as radioimmunoassays (RIA), mass spectrometer (MS), capillary gas liquid chromatography and high performance liquid chromatography (HPLC), ultraviolet (UV) spectrometry, as well as an array of immunoassay tests. None of these techniques, however, is readily in use in Nigeria to detect BAC limits of athletes. This lapse calls for a redefinition and re-evaluation of our "fight" for athletes' indulgence in pharmacological ergogenic aids to which alcohol constitutes its proactive type.

## **Conclusion**

The high incidence of alcohol induced accidents or injuries in Nigeria which is a consequence of abuse of safety and the protection of human rights in most psychomotor tasks such as motor vehicle driving, motor cycle riding or sports performance calls for Blood Alcohol Concentration (BAC) legislation. BAC threshold should not only be established in Nigeria, but creating awareness on issues that are related to alcohol its consumption

perception and dangers as well as establishing the machinery for enforcing the legislation should be worked out too.

Nigerian scientists need to research into blood alcohol concentration and needs to regularly update themselves on various screening tools. All Stakeholders must take part in media advocacy to reduce incidence of driving under the influence of alcohol. Appropriate enactment of BAC laws with proper enforcement in our society is imperative to enhance safety on our high way and other psychomotor skills such as sports and industrial engagements.

The Federal Road Safety Commission needs step up its campaign awareness strategies as there is the need to properly enlighten Nigerians on not only the ethnics of driving but the danger that portend the effect of alcohol on motor performance and the attendant hazardous effect on the Nigerian citizenry.

The respective State Government needs to put in place an enlightenment team to help educate the public on the need for a proper nutrition pattern as this could go a long way in reducing the attendant effects of alcohol.

Through legislation, there should be a ban on the sale of alcohol in certain volatile areas, e.g. motor parks and stadium so as to further discourage consumption rate.

The Federal Road Safety Commission should carry out periodic alcohol screening tests in all the states. It is further suggested that more researches in this area be encouraged and carried out with the view to solving some of the attendant problems associated with alcohol and driving or other motor performances.

## **References**

1. National Institute on Drug Abuse (NIDA) and National Institute on Alcohol Abuse and Alcoholism (NIAAA) 1998.

- [http://www.niaaa.nih.gov/publications/aa\\_31.htm](http://www.niaaa.nih.gov/publications/aa_31.htm). Accessed September 24 2003.
2. Federal Republic of Nigeria. *Highway Code*, Abuja: Federal Road Safety Commission, 1997 <http://safety.fhwa.dot.gov/about/international/africa/appc.htm>. Accessed 19<sup>th</sup> Nov 2005.
  3. Federal Republic of Nigeria. CAP 148 (Traffic Code Law) section 27(1), 1967.
  4. SAVAN Brochure: - Accident Diary [www.savan.org](http://www.savan.org) accessed 12<sup>th</sup> Jan. 2004.
  5. Girdano DA, Dusek D. *Drug Education Content and Methods*, Third Edition, U.S.A. Addison – Wesley Publishing Company, 1980.
  6. <http://mdma.net/ecstasy-culture/> Accessed 19<sup>th</sup> Nov 2005.
  7. Agwubike EO. *Preventive Medicine: Safety, Accident, Injury and First Aid*, Benin City: Osasu Publishers, 2000.
  8. Rehn N, Room R, Edwards G. *Alcohol in the European Region: Consumption, Harm and policies*, Copenhagen: WHO Regional Office for Europe, 2001. <http://www.scotland.gov.uk/cru/kd01/red/iapl-04.asp>. Accessed 19<sup>th</sup> Nov 2005.
  9. Riley L, Marshall M. *Alcohol and Public Health in 8 Developing Countries*. Geneva: World Health Organization, 1999.
  10. Moskowitz H, Burns M, Fiorentino D, Smiley A, Zador P. *Driver Characteristics and Impairments at various BACs*. Washington, D.C.; National Highway Traffic Safety Administration, 2000.
  11. Grant M, Litvak J. *Drinking patterns and their consequences*. Washington, D.C: Taylor & Francis, 1998. [http://europa.eu.int/comm/health/ph\\_determinants/life\\_style/alcohol/documents/ev\\_20050120\\_co03\\_en.pdf](http://europa.eu.int/comm/health/ph_determinants/life_style/alcohol/documents/ev_20050120_co03_en.pdf). Accessed 19<sup>th</sup> Nov 2005.
  12. Jones AW. *Alcohol, Drugs, and Driving* 6(2): 1-25, 1990.
  13. Scheinberg, P.F. & Stouffer, R.E. *Highway Safety: Effectiveness of State 0.8 Blood Alcohol Concentration Law*. Washington, D.C.: General Accounting Office, 1999. <http://www.icadts.org/T2004/pdfs/O73.pdf> Accessed 19<sup>th</sup> Nov 2005.
  14. Bloomberg, R.D. *Lower BAC Limits for Youth: Evaluation of the Maryland 02 Law*. Washington, D.C.: National Highway Traffic Safety Administration, 1992. [http://www.icap.org/portals/0/download/all\\_pdfs/1CAP\\_Reports\\_English/report11.pdf](http://www.icap.org/portals/0/download/all_pdfs/1CAP_Reports_English/report11.pdf). Accessed 19<sup>th</sup> Nov 2005.
  15. America Medical Association (1996). *Driving Impairment Through Alcohol and Other Drugs*. Long man, BMA. <http://www.ama-assn.org/ama/pub/category/13565.html> Accessed 19<sup>th</sup> Nov 2005.
  16. Anugweje RC. *The biochemistry of Sports*, Portharcourt: University of PortHarcourt Press Ltd, 2000.
  17. Thomasson H (2000). *Alcoholism: Clinical and Exper Res*. 2000; 24 (4): 419-20.
  18. Braddely KA, Boyd-Wickizer J, Powell SH, Burman ML. Alcohol Screening Questionnaires in Women. *JAMA*, 1998; 280: 166-71.
  19. WHO / SA/ 92.4, P.2 as reflected on <http://www.intox.com/physiology.asp>? selected text = About Alcohol. Accessed 23 Feb 2003.
  20. Nkowan AM, Jansen MA. Substance abuse in Africa. *Africa Health*. 1999; 22 (1) Nov: 15-16.
  21. Agwubike EO, Adodo SM, Igiehon A, Aluko K. The Effects of Caffeine (Coffee) on the psychophysiological variables of selected university athletes. *Benin Journal of Educational Studies*. 2000; 12 & 13 (1 & 2): 212-9.
  22. Gentry, R.T. (2000). *Alcoholism: Clinical and Experimental Research*. 2000; 24 (4): 404-5.
  23. Wilmore, J.H. & Costill, D.L. (1994). *Physiology of Sport and Exercise*, Champaign, IL: Human Kinetics. *Br J Sports Med*. 1994; 28: 267-71.
  24. Kleiner SM (1996). *In High Spirits?: Alcohol and your Health*. The Physician and Sports medicine. 1996; 24:9.
  25. Parsons BS. *Sport, Exercise and Alcohol*. Stone, W.J & Kroll, W.A. (1978), *Sports Conditioning and Weight Training: Programme for athletics competition*, Boston: Allyn and Bacon, Inc., 2003.