



## **A COMPARISON OF BANNED SUBSTANCES AND METHODS USED BY MALE AND FEMALE ATHLETICS IN ATHLETICS AT OLYMPIC GAMES FROM 1976 TO 2012**

**Bhopinder Singh**, Research Scholar, Indira Gandhi Institute of Physical Education and Sports Sciences, New Delhi 110018

### *Abstract*

The Aim of present study is “A Comparison of Banned Substances Used by Male and Female Athletics at Olympic Games from 1976 to 2012”. To attain the objective of the research descriptive statistics is used. Banned Substances were identified under the guide line of world anti-doping agency. Olympic level athletes (male & female) were identified from different countries on the basis of their use of banned substances and methods in different events in Athletics. Present study signifies the Scenario of banned substances and methods used in the Olympic Games. It also represents the comparison of banned substances and methods used by male and female athletes in athletics at different Olympic Games as well as in different events of athletics. Finding of the study reveals that female athletics use (11.63%) more banned substances than male athletes in athletics at Olympics, it was quite surprising to note that female athletes use (17.126%) more of Anabolic Androgenic Steroids (AAS) than male athletes in athletics at Olympic game.



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### **Introduction**

**Ancient Olympics:** According to historical records, the first ancient Olympic Games can be traced back to 776 BC. They were dedicated to the Olympian gods and were staged on the ancient plains of Olympia. They continued for nearly 12 centuries, until Emperor Theodosius decreed in 393 A.D. that all such "pagan cults" be banned.(1)

All free male Greek citizens were entitled to participate in the ancient Olympic Games, regardless of their social status. Orsippos, a general from Megara; Polymnistor, a shepherd;

Diagoras, a member of a royal family from Rhodes; Alexander I, son of Amyndas and King of Macedonia; and Democritus, a philosopher, were all participants in the Games.

Married women were not allowed to participate in, or to watch, the ancient Olympic Games. However, unmarried women could attend the competition, and the priestess of Demeter, goddess of fertility, was given a privileged position next to the Stadium altar. (2)

**Modern Olympics:** History it was Pierre de Coubertin of France who dreamt up this ambitious project, although others before him had tried in vain to revive these Games. Drawing inspiration from the ancient Olympic Games, he decided to create the modern Olympic Games. With this purpose, he founded the International Olympic Committee (IOC) in 1894 in Paris. The new committee set itself the objective of organising the first Olympic Games of modern times. The date of the first Games, 1896, marked the beginning of an extraordinary adventure that has now lasted for over a century. (3)

**Women at games:** In 1900 Paris Olympic Games First Women took part, four years after the first modern Olympic Games in Athens. Reviver of the modern Games, Pierre de Coubertin, 22 women out of a total of 997 athletes competed in just five sports: tennis, sailing, croquet, equestrian and golf. But only golf and tennis had events for women only. Female participation has increased steadily since then, with women accounting for more than 44 per cent of the participants at the 2012 Games in London, compared with 23 per cent at the Games in 1984 in Los Angeles and just over 13 per cent at the 1964 Games in Tokyo. In the last 20 years, the IOC has also increased the number of women's events on the Olympic programme, in cooperation with the International Federations (IFs) and the Organising Committees. With the addition of women's boxing, the 2012 Olympic Games in London were the first in which women competed in every sport on the Olympic programme. (4)

**First official uses of banned substance:** Hans-Gunnar Liljenwall is a male from Swedish who compete modern pentathlete, (5)he disqualified from the Swedish team at the 1968 Summer Olympics due to use alcohol. Liljenwall was the first athlete to be disqualified at the Olympics for drug use, following the introduction of anti-doping regulations by the International Olympic Committee in 1967. Liljenwall reportedly had "two beers" to calm his nerves before the pistol shooting event. The Swedish team eventually had to return their bronze medals. (6)

**First use of banned substance in athletics:** At 1976 Montreal Olympics there were ten official cases of drug abuse in which first ever drug abuse was coming in front from Athletics, Danuta **Rosani** was a female Polish champion in the discus in 1974, 1976 and 1978, winning 14 medals between 1972 and 1985, including three silvers in the shot put. In

1983, she was also national indoor champion in the shot put. (7) At the 1976 Montréal Olympics she was disqualified for **anabolic steroid** use, which was the first official doping case in the history of track & field at the Olympics, Anabolic steroids were founded abused. (8)

**First official Males as abuser in athletics:** At Los angles (1984) Olympics there were twelve official cases of drug abuse in which four are from athletics in which there were two males, **Vésteinn Hafsteinsson** is male discus thrower from Iceland, who represented his native country at four consecutive Summer Olympics, starting in 1984. At the Los Angeles summer Olympic Games, he tested positive for **nandralone** and was disqualified.

(9) **Giampaolo Urlando** was a male Italian hammer thrower, (10) He ended up in fourth place at the 1984 Summer Olympics, but was disqualified for **testosterone** use. (11) **Martti Vainio** was a male Finnish former long-distance runner (12), Vainio also qualified for the 5000 metres final, but was not permitted to start after his doping sample following the 10,000 metres final tested positive for **Metenolone**. (13)

**Substances & Methods Prohibited by WADA:** In accordance with article 4.2.2 of the world anti-doping code, all prohibited substances shall be considered as “specified substances” except substances in classes S1, S2, S4.4, S4.5, S6. a, and prohibited methods M1, M2 and M3.

S0. Non-approved substances,

any pharmacological substance which is not addressed by any of the subsequent sections of the list and with no current approval by any governmental regulatory health authority for human therapeutic use (e.g drugs under pre-clinical or clinical development or discontinued, designer drugs, veterinary medicines) is prohibited at all times.

S1. Anabolic Agents anabolic agents are prohibited.

1. Anabolic Androgenic Steroids (AAS)

a. Exogenous\* AAS, Including:

b. Endogenous\*\* AAS when administered exogenously:

2. Other Anabolic Agents, including but not limited to: clenbuterol, selective androgen receptor modulators (sarms), tibolone, zeranol, zilpaterol.

\* “exogenous” refers to a substance which is not ordinarily capable of being produced by the body naturally. the 2012 prohibited list 24 august 2011

\*\* “endogenous” refers to a substance which is capable of being produced by the body naturally.

S2. Peptide Hormones, Growth Factors and Related Substances,

The following substances and their releasing factors are prohibited:

1. Erythropoiesis-Stimulating Agents [e.g. erythropoietin (EPO), darbepoetin (dEPO), hypoxia-inducible factor (HIF) stabilizers, Methoxy polyethylene glycol-epoetin beta (CERA), peginesatide (Hematide)];
2. Chorionic Gonadotrophin (CG) and Luteinizing Hormone (LH) in males;
3. Insulins;
4. Corticotrophins;
5. Growth Hormone (GH), Insulin-like Growth Factor-1 (IGF-1), Fibroblast Growth Factors (FGFs), Hepatocyte Growth Factor (HGF), Mechano Growth Factors (MGFs), Platelet-Derived Growth Factor (PDGF), Vascular-Endothelial Growth Factor (VEGF) as well as any other growth factor affecting muscle, tendon or ligament protein synthesis/degradation, vascularisation, energy utilization, regenerative capacity or fibre type switching; and other substances with similar chemical structure or similar biological effect(s).

S3. Beta-2 Agonists,

All beta-2 agonists (including both optical isomers where relevant) are prohibited except salbutamol (maximum 1600 micrograms over 24 hours), formoterol (maximum 36 micrograms over 24 hours) and salmeterol when taken by inhalation in accordance with the manufacturers' recommended therapeutic regime.

S4. Hormone and Metabolic Modulators,

1. Aromatase inhibitors including, but not limited to: aminoglutethimide, anastrozole, androsta-1,4,6-triene-3,17-dione (androstatrienedione), 4-androstene-3,6,17 trione (6-oxo), exemestane, formestane, letrozole, testolactone.
2. Selective estrogen receptor modulators (SERMs) including, but not limited to: raloxifene, tamoxifen, toremifene.
3. Other anti-estrogenic substances including, but not limited to: clomiphene, cyclofenil, fulvestrant.
4. Agents modifying myostatin function(s) including, but not limited, to: myostatin inhibitors.
5. Metabolic modulators: Peroxisome Proliferator Activated Receptor  $\delta$  (PPAR $\delta$ ) agonists (e.g. GW 1516), PPAR $\delta$ -AMP-activated protein kinase (AMPK) axis agonists (e.g. AICAR)

S5. Diuretics and Other Masking Agents,

Masking agents are prohibited. They include: Diuretics, desmopressin, plasma expanders (e.g. glycerol; intravenous administration of albumin, dextran, hydroxyethyl starch and mannitol), probenecid; and other substances with similar biological effect(s). Local application of felypressin in dental anaesthesia is not prohibited.

### **Categories Prohibited In-Competition**

#### **S6. Stimulants,**

All stimulants (including both optical isomers where relevant) are prohibited, except imidazole derivatives for topical use and those stimulants included in the 2012 Monitoring Program.

#### **S7. Narcotics,**

The following are prohibited: Buprenorphine, dextromoramide, diamorphine (heroin), fentanyl and its derivatives, hydromorphone, methadone, morphine, oxycodone, oxymorphone, pentazocine, pethidine.

#### **S8. Cannabinoids Natural,**

(e.g. cannabis, hashish, marijuana) or synthetic delta 9- tetrahydrocannabinol (THC) and cannabimimetics [e.g. "Spice" (containing JWH018, JWH073), HU-210] are prohibited.

#### **S9. Glucocorticosteroids,**

All glucocorticosteroids are prohibited when administered by oral, intravenous, intramuscular or rectal routes.

### **Prohibited Methods**

#### **M1. Manipulation of blood and blood components,**

1. The Administration or reintroduction of any quantity of autologous, allogenic (homologous) or heterologous blood, or red blood cell products of any origin into the circulatory system.

2. Artificially enhancing the uptake, transport or delivery of oxygen. Including, but not limited to: Perfluorochemicals; efaproxiral (RSR13) and modified haemoglobin products, e.g. haemoglobin-based blood substitutes and microencapsulated haemoglobin products, excluding supplemental oxygen.

3. Any form of intravascular manipulation of the blood or blood components by physical or chemical means.

#### **M2. Chemical and physical manipulation,**

1. Tampering, or Attempting to Tamper, to alter the integrity and validity of Samples collected during Doping Control. Including, but not limited to: Urine substitution and/or adulteration, e.g. proteases.
2. Intravenous infusions and/or injections of more than 50 mL per 6 hours' period except for those legitimately received in the course of hospital admissions, surgical procedures or clinical investigations.

M3. Gene doping

1. The transfer of polymers of nucleic acids or nucleic acid analogues;
2. The use of normal or genetically modified cells. (14)

**PROCEDURES AND METHODS:** In direction to achieve the objectives of study, known and acceptable methods of obtaining data were used, qualitative and quantitative data was collected through the website of international association of athletic federation, e-books and some primary resources such as newspaper, books etc. The obtained data constitutes the use of the banned methods and substances in athletics by male and female athletes at Olympics from 1976-2012.

For the target of the study data was collected from the year 1976 to 2012. The collected information emphasizes on the comparison of the banned substances and methods used by male and female athletes of various events in athletics at Olympic Games. Mainly the banned substances and methods used by the male and female athletes in summer Olympic games was collected to compile so that it can clearly depicts the comparison of banned substances and methods used by male and female athletes in athletics at Olympics in descriptive manner. The same procedure was adopted for each Olympic game. After getting the comparison of banned methods and substances used by male and female athletes in athletics at Olympic games they were tabulated in Olympic game year wise, event wise, banned method wise and banned substance wise for analysis.

**ANALYSIS OF THE STUDY:** The obtained data has been presented in the forms of tables from table no.1 to table no.4, followed by their interpretation and their representation in the form of histogram from fig no.1 to fig no.4.

**Table No.1: Comparison of banned substances used by male and female athletes in athletics at Olympics since Montreal (1976) to London (2012).**

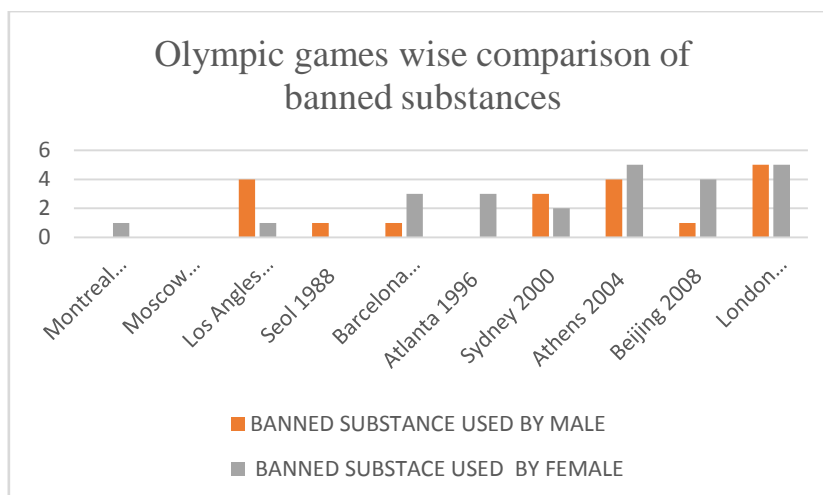
OLYMPIC GAME	BANNED SUBSTANCES USED BY	
	MALE ATHLETES	FEMALE ATHLETES
Montreal 1976	00	01
Moscow 1980	00	00*
Los Angeles 1984	04	01
Seoul 1988	01	00
Barcelona 1992	01	03
Atlanta 1996	00	03
Sydney 2000	03	02
Athens 2004	04	05
Beijing 2008	01	04
London 2012	05	05

\*It has been claimed that athletes had begun using **testosterone** and other drugs for which **tests had not been yet developed.** (5)

5. [http://www.realchampion.jp/assets/uploads/2013/03/2012\\_ProhibitedList\\_EN.pdf](http://www.realchampion.jp/assets/uploads/2013/03/2012_ProhibitedList_EN.pdf)

Table No. 1 depicts the comparison of banned substances used by male and female athletes in athletics from 1976 to 2012 Olympic games, In Montreal(1976) Olympic games there was only 1case of banned substance which was a female, in Moscow (1980) Olympic games there was no banned substance identified, in Los Angeles (1984) Olympic games there were 5 cases of banned substances in which there was 1 male and 4 females, in Seoul (1988) Olympic games there was only 1 case of banned substance which was a male, in Barcelona (1992) Olympic games there were 4 cases of banned substances in which there was 1 male and 3 females, in Atlanta (1996) Olympic games there were 3 cases of banned substances in which all were females, in Sydney (2000) Olympic games there were 5 cases of banned substances in which there were 3 males and 2 females, in Athens (2004) Olympic games there were 9cases of banned substances in which there were 4 males and 5 females, Beijing (2008) Olympic games there was 5cases of substances in which there was 1 male and 4 females and in London (2012) Olympic games there were 10cases of banned substances in which there were 5 males and 5 females respectively. The graphically representation of the above data is presented in Figure No. 1 below.





**Fig. No:1 Graphical presentation on the Comparison of banned substances used by male and female athletes in athletics at Olympics since Montreal (1976) to London (2012).**

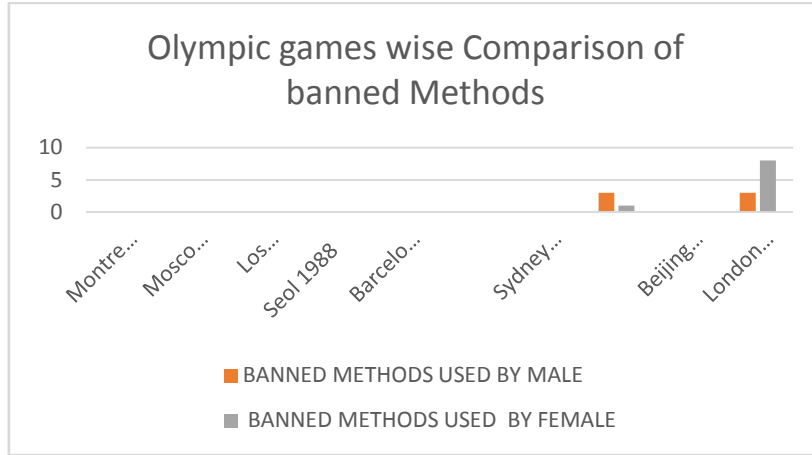
**Table No.2: Comparison of banned methods used by male and female athletes in athletics at Olympics since Montreal (1976) to London (2012).**

OLYMPIC GAME	BANNED METHODS USED BY	
	MALE ATHLETES	FEMALE ATHLETES
Montreal 1976	00	00
Moscow 1980	00	00
Los Angeles 1984	00	00
Seoul 1988	00	00
Barcelona 1992	00	00
Atlanta 1996	00	00
Sydney 2000	00	00
Athens 2004	03	01
Beijing 2008	00	00
London 2012	03	08

Table No. 2 depicts the comparison of banned methods used by male and female athletes in athletics from 1976 to 2012 Olympic games, In Montreal(1976) Olympic games there was no case of banned methods, in Moscow (1980) Olympic games there was no case of banned methods, in Los Angeles (1984) Olympic game there was no case of banned methods , in Seoul (1988) Olympic game there was no case of banned methods, in Barcelona (1992) Olympic games there was no case of banned methods, in Atlanta (1996) Olympic games there was no case of banned methods, in Sydney (2000) Olympic games there was no case of banned methods, in Athens (2004) Olympic games there were 4 methods in which there were



3 males and 1 female, Beijing (2008) Olympic games there was no case of banned methods and in London (2012) Olympic Games there were 11 cases of banned methods in which there were 3 males and 8 females respectively. The graphically representation of the above data is presented in Figure No. 2 below.



**Fig. No:2 Graphical presentations on Comparison of banned methods used by male and female athletes in athletics at Olympics since Montreal (1976) to London (2012).**

**Table No.3: Comparison of banned substances used by male and female athletes in athletics at Olympic along with percentage.**

BANNED SUBSTANCE	GROUP	BANNED SUBSTANCES	
		USED BY MALE	USED BY FEMALE
Stanozolol	s1.1a	2(10.520%)	3(12.500%)
Clenbuterol	s1.2	2(10.520%)	2(8.330%)
Erythropoietin	s2.1	3(15.780%)	0
Testosterone	s1.1a	3(15.780%)	0
Oxandrolone	s1.1a	1(05.260%)	2(8.330%)
Cera	s2.1 <b>1.1</b>	1(05.260%)	2(8.330%)
Nandralone	s1.1a	2(10.520%)	1
Metenolone	s1.1a	2(10.520%)	1
Anabolic Steroids	s1.1a	0	2(8.330%)
Methandrostenolone	s1.1a	0	2(8.330%)
Tetrahydrogestrone	s1.1a	0	2(8.330%)
Blast of Red	s0	0	1(4.160%)
Mesocarb	s6a	0	1(4.160%)
Methandienone	s1.1	0	1(4.160%)
Methytestosterone	s1.1a	0	1(4.160%)
Methyltrienolone	s1.1a	0	1(4.160%)
Methylhexanemine	s6b	0	1(4.160%)
Norephedrine	s6b	0	1(4.160%)
Dhea	s1.1b	1(05.260%)	0
Furoseminde	s5	1(05.260%)	0
Hgh	s2	1(05.260%)	0

Table No.2 depicts the comparison of the banned substance used by male and female athletes in athletics from Montreal (1976) to London (2012) Olympics along with the identified group of substance and percentage of a particular banned substance in respect to the use of banned substances as a whole in males and females separately, Stanozolol (S1.1<sup>a</sup>) observed in 2 males(10.520%) and 3 females(12.500%), Clenbuterol (S1.2) observed in 2 males(10.520%) and 2 females(8.330%), Erythropoietin (S2.1) observed only in 3 males(15.780%), Testosterone (S1.1<sup>a</sup>) observed only in 3 males(15.780%), Oxandrolone (S1.1<sup>a</sup>) observed in 1 male(05.260%) and 2 females(8.330%), Cera (Continuous Erythropoiesis Receptor Activator)(S2.1.<sup>1.1</sup>) observed in 1 male(05.260%) and 2 females(8.330%), Nandralone (S1.1<sup>a</sup>) observed in 2 males(10.520%) and 1 female(4.160%), Metenolone (S1.1<sup>a</sup>) observed in 2 males(10.520%) and 1 female(4.160%), Anabolic steroids (S1.1<sup>a</sup>)observed only in 2 females(8.330%), Methandrostenolone (S1.1<sup>a</sup>) observed only in 2 females(8.330%), Tetrahydrogestrone (S1.1<sup>a</sup>) observed only in 2 females(8.330%), Blast of Red (S0) observed only in 1 female(4.160%), Mesocarb (S6<sup>a</sup>) observed only in 1 female(4.160%), Methandienone(S1.1) observed only in 1 female(4.160%), Methytestosterone (S1.1<sup>a</sup>) observed only in 1 female(4.160%), Methyltrienolone (S1.1<sup>a</sup>) observed only in 1 female(4.160%), Methylhexanemine (S6<sup>b</sup>) observed only in 1 female(4.160%), Norephedrine (S6<sup>b</sup>) observed only in 1 female(4.160%), Dhea (S1.1<sup>b</sup>) observed only in 1 male(05.260%), Furosemide (S5) observed only in 1 male(05.260%) and Hgh (Human growth Hormone) (S2) observed only in 1 male(05.260%) respectively. The graphically represented of the data is presented in Figure No.3.

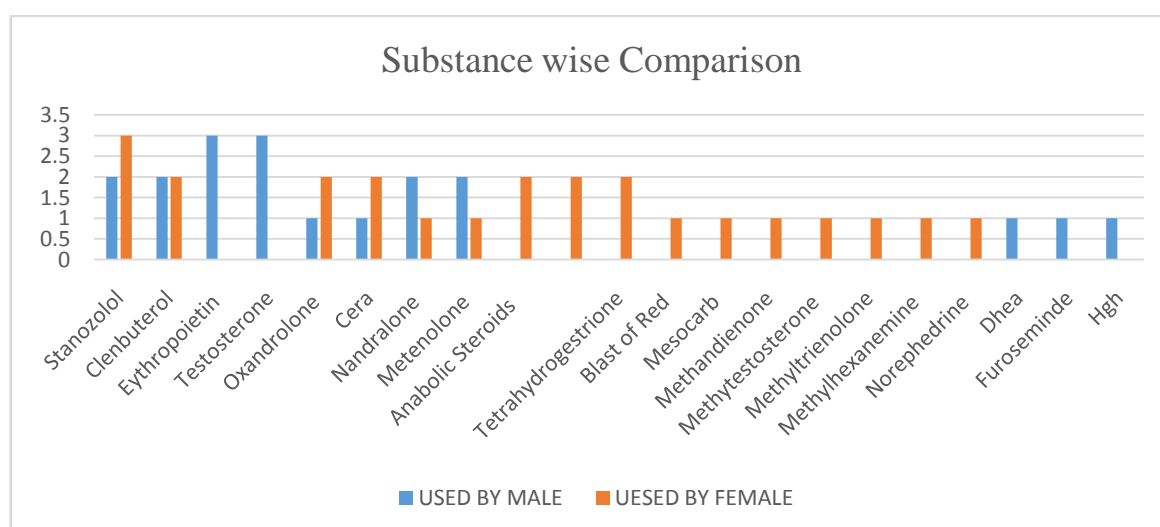
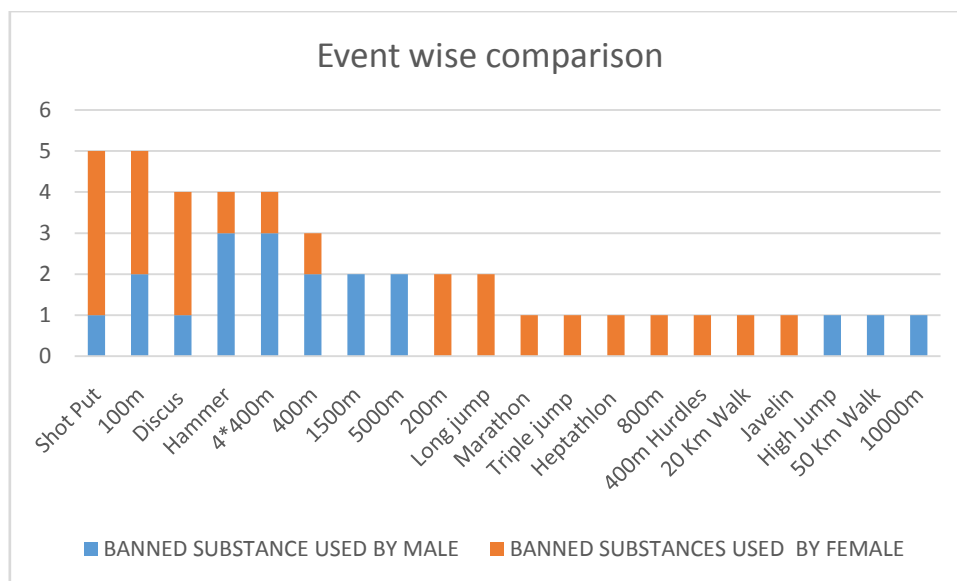


Fig. No:3 Graphical presentations on Comparison of banned substances used by male and female athletes in athletics at Olympics.

**Table No.4: Event wise Comparison of banned substances used by male and female athletes in athletics at Olympics since Montreal (1976) to London (2012).**

EVENTS	BANNED SUBSTANCE	
	USED BY MALE	USED BY FEMALE
Shot Put	1	4
100m	2	3
Discus	1	3
Hammer	3	1
4*400m	3	1
400m	2	1
1500m	2	0
5000m	2	0
200m	0	2
Long jump	0	2
Marathon	0	1
Triple jump	0	1
Heptathlon '	0	1
800m	0	1
400m Hurdles	0	1
20 Km Walk	0	1
Javelin	0	1
High Jump	1	0
50 Km Walk	1	0
10000m	1	0

Table No. 4 depicts the event wise comparison of banned substance used by male and female athletes in athletics from Montreal (1976) to London (2012) Olympics along with the percentage of a particular event in respect to the use of banned substances in events as a whole in males and females individually, In the Shot Put there were 1 male and 4 females, in 100meters there were 2 males and 3 females, in Discus there were 1 male and 3 females, in Hammer there were 3 males and 1 female, in 4\*400m Relay there were 3 males and 1 female,in 400m there were 2 males and 1 female, in 1500m there were only 2 males, in 5000m there were only 2 males, in 200m there were only 2 females, in only long jump there were only 2 females, in marathon there was only 1 female, in triple jump there was only 1 female, in Heptathlon there was only 1 female, in 800m there was only 1 female, in 400m Hurdles there was only 1 female, in 20km Walk there was only 1 female, in javelin throw there was only 1 female, in High jump there was only 1 male, in 50 Km Walk there was only 1 male and in 10000m there was only 1 male respectively. The graphically represented of the data is presented in Figure No.4.



**Fig. No:4 Graphical presentations on banned methods and substances used in athletics at Olympics from Los Angeles (1984)to London (2012).**

**FINDING OF THE STUDY**

- Finding discloses that there were 43 cases of banned substances used by both male and female athletes in athletics since Montreal Olympics (1976) to London Olympics (2012).
- There were 19 male cases and 24 female cases of the banned substance used in athletics were identified.
- It reveals that since Montreal Olympics (1976) to London Olympics (2012) use of banned substances by both male and female athletes in athletics was maximum in the London Olympics which was 5 cases each.
- On the contrary during Montreal (1976), Los Angeles (1984) Olympics by females and during Seoul (1988), Barcelona (1992) and Beijing (2008) by males there was least use of banned substance in athletics which was 1 in number.
- Decreasing trend in the use of banned substance by male athletes in athletics has been observed from Los Angeles Olympics (1984) till Atlanta Olympics (1996) which was 4 during Los Angeles (1984), 1 during Seoul (1988), 1 during Barcelona (1992) and 0 during Atlanta (1996) Olympics.
- There after increasing trend observed in use of banned substances by male athletes as 3 and 4 during Sydney (2000) and Athens (2004) respectively.
- There after use of banned substances by male athletes again decreased 1 at Beijing 2008, whereas there after it again increases 5 at London Olympics 2012

- Since Montreal (1976) to London (2012) Olympics use of banned substance by female athletes in athletics was maximum in Athens (2004) and London (2012) Olympics which was 5 in number.
- On the contrary during Seoul (1988) Olympics there was least use of banned substance by female athletes, relatively in Moscow (1980) Olympics there was no such test available to detect testosterone so officially there was no use of banned substances.
- Whereas decreased trend in use of banned substance by female athletes in athletics has been observed from Montreal Olympics (1976) till Moscow Olympics (1980) which was 1 during Montreal (1984) and 0 during Moscow (1980).
- There after it again decrease as 3 during Los Angeles (1984) and 0 during Seoul (1988) Olympics, there after again decreasing trend observed from Barcelona (1992) till Sydney (2000) Olympics, which was 3 during Barcelona (1992), 2 during Atlanta (1996) and 1 during Sydney (2000) Olympics.
- There after it increased as 5 at Athens (2004), whereas there after increasing trend observed from Beijing (2008) till London (2012) Olympics which was 4 and 5 respectively.

#### **Event wise comparison**

- If we compare the events in which banned substances was used by male and female athletes in athletics at Olympics, in Shot put maximum female cases were identified which was 4 in numbers, similarly maximum male cases were observed in Hammer, 4\*400M Relay which was 3 in number.
- Contrary to that in Marathon, Triple Jump, Heptathlon, 800m, 400m Hurdles, 20km Walk and Javelin least female cases were observed which is 1 in number, likewise least male cases were identified in Shot put, Discus, High jump, 50km Walk, 10000m which was 1 in number.
- Whereas 2-2 female cases were seen in 200m, Long jump, 100m, 400m, 1500m, 5000m 2-2 male cases were seen.
- It was quite surprising to note that (55.815%) cases of all the banned substances used in athletics at Olympics were female cases, on the other side only (44.186%) male cases were identified. It clearly depicts that female athletes use (11.63%) more banned substances than male athletes in athletics at Olympics.

### **Substance wise comparison**

- If we compare the banned substance used by male and female athletes in athletics at Olympics, which is identified group of banned substance wise as well as banned substance wise throughout, Maximum female cases were identified from Stanozolol (S1.1<sup>a</sup>) which were 3 in number, alike wise in erythropoietin(S2.1) and Testosterone(S1.1<sup>a</sup>) maximum male cases were observed which was 3 cases each.
- On the contrary to that least female cases received by Nandralone (S1.1a), Metenolone (S1.1a), Blast of Red (S0), Mesocarb(S6a), Methandienone(S1.1a), Methyltestosterone(S1.1a), Methyltrienolone(S1.1a), Methylhexanemine (S6b) and Norephedrine (S6b) which was 1 number, in same manner Oxandrolone(S1.1<sup>a</sup>), Cera(S2.1<sup>1.1</sup>), Metenolone(S1.1<sup>a</sup>), Dhea(S1.1<sup>b</sup>), Furoseminde(S5) and Hgh(S2) received the least male cases which was 1 in number.
- However, 2-2 female cases were observed in Clenbuterol (S1.2), Oxandrolone (S1.1<sup>a</sup>), Cera (Continuous Erythropoiesis Receptor Activator) (S2.1<sup>1.1</sup>), Anabolic steroids (S1.1<sup>a</sup>), Methandrostenolone (S1.1<sup>a</sup>), Tetrahydrogestrione (S1.1<sup>a</sup>), similarly Stanozolol(S1.1<sup>a</sup>), Clenbuterol(S2), Nandralone(S1.1<sup>a</sup>) had 2-2 male cases each.

It is quite shocking to note that that (75%) of female cases and (57.874%) of male cases of all the banned substances used in athletics at Olympic games is from S1 group which is Anabolic Androgenic Steroids (AAS). It was very clearly identified that female athletes use (17.126%) more of Anabolic Androgenic Steroids (AAS) than male athletes in athletics at Olympic game.

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