

Hyperandrogenism Regulations and Women's Right to Participate in Competitive Sports

Rupali Mehta^{1*}, Shivam Singla², Usha Rani³, Karan Singh⁴

¹Research Scholar, Department of Laws, Panjab University, Chandigarh, India

²Research Scholar, Department of Law, Maharishi Markandeshwar Deemed to be University, Mullana, Ambala, Haryana, India

³Associate Professor, Department of Law, NIILM University, Kaithal, Haryana, India

⁴Research Scholar, Department of Law, Kurukshetra University, Kurukshetra, Haryana, India

Abstract

In this paper, it is discussed whether the regulations on hyperandrogenism in elite women's sports can be harmonized with women's right to participate in competitive sport. The paper first reviews, by a doctrinal and source-coded approach, eight of the provided academic, legal and medical sources, followed by the current World Athletics 2023 DSD Regulations and the 2026 Olympic Charter, and concludes that the female category could be a legitimate regulatory tool, but that testosterone-based eligibility rules are subject to a high-proportionality standard. There is a disagreement over the evidence base. World Athletics has taken the general relevance of androgens to muscle mass, haemoglobin, lean mass and some performance parameters on faith and the relevant evidence is endocrinological studies. Meanwhile, bioethics and legal scholarship demonstrate that testosterone cannot be a full substitute for sex testing, suspicion-based enforcement can result in sex testing, and treatment as eligibility can be an infringement on bodily integrity, privacy, equality and due process. We propose therefore a rights-compatible framework, which would require that eligibility restrictions be event-specific, evidence-based, reviewed regularly, that the athlete's medical care be excluded, be confidential, be appealable and follow the principle of the least restrictive means. Sport does not have to stop all sex classification in order to have the right to participate. It does call on governing bodies to argue exclusions based on more than a fear of a category nightmare and to think of the affected woman as an athlete as much as an exception.

Keywords: hyperandrogenism; DSD; women in sport; testosterone; right to participate; proportionality; Caster Semenya; Dutee Chand

1. INTRODUCTION

Lines are a key ingredient in elite sport. The boundaries of what is "legal" and "illegal" are based on Age Bands, Weight Classes, Anti-Doping lists, Equipment rules and Disability classifications. The female category is also a line, but a line which is different and charged with sporting justice and the legal and social implication of being a woman. Hyperandrogenism regulations are at the most challenging part of that link. They don't just deal with doping. They wonder if a woman has a 'man' type body, with levels of testosterone outside the normal female range, if she should change that body, or accept that she can't compete at the highest level.

The issue came into the world's spotlight with the treatment of Caster Semenya at the World

Championships in 2009, and the success of Dutee Chand's challenge to the previous International Association of Athletics Federations (IAAF) regulations in 2015. It has since undergone several changes: the 2011 hyperandrogenism rules with a 10 nmol/L threshold; the 2018-2019 Differences of Sex Development (DSD) rules, which included a 5 nmol/L threshold and applied to 400 m to one-mile events; and the 2023 World Athletics rules which mandated that relevant DSD athletes have to keep their serum testosterone levels below 2.5 nmol/L for a minimum of 24 months to compete in the female classification at World Rankings competitions. It is not a minor revision of the technology. Broadens the scope of events to any event and reduced the biochemical ceiling into more normal female clinical reference ranges.

The combination of regulation and a right is deliberately in this paper because it involves the right of women to participate in competitive sports. The right is not absolute, meaning everyone can be in every category without any eligibility requirements. Under the current Olympic Charter (24 June 2025), the right to practise sport is a human right, and access should be made without discrimination within the Olympic Movement; sport rules are also the responsibility of sport organisations. But rather, can sport classify? It is whether the current system of hyperandrogenism regulation is warranted by adequate evidence, adequate design and adequate safeguards.

In this paper I make three claims. First, in many of the super elite events there is a legitimate argument for the fairness rationale for sex classification for aggregate male v. female differences still not being small in speed, strength and power events. Second, the biological relevance of testosterone for certain performance pathways remains and the evidence is limited in breadth to not suggest that serum testosterone is a complete, individual and self-evidently fair proxy for competitive advantage in women with naturally atypical bodies. Third, the medical, privacy and participation effects on a small group of women impose a burden on the women; proportionality should be used as the governing principle: A rule must serve a legitimate aim, be based on reliable event-specific evidence, have as minimal an impact as possible on participation, and have independent medical and procedural safeguards. In that regard, the existing approach to regulation is misinformed, without sufficient evidence review, without athlete-centered care, and without a mechanism for appeals.

2. LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

Out of the literature provided, it is split but not contradictory. The most powerful bioethical critique is given by Karkazis, Jordan-Young, Davis and Camporesi (2012). They claim the policies of 2011 were based on shaky assumptions concerning endogenous testosterone, that they were developed in a narrow medical process, and that they had the potential of generating more of the same kind of sex testing as in the past, via suspicion, leaks and gender policing. To them, hyperandrogenism is a natural form of variation like many of the accepted advantages of sporting elite status, including unusual aerobic capacity, body morphology and exceptional vision. Their main ethical pivot is the distinction between cheating and natural embodiment: Doping is the use of a forbidden substance from the outside, but naturally high testosterone levels are part of the athlete's physiology.

The following position can be found in Sanchez, Martinez-Patino and Vilain (2013). They don't believe the 'rules' from 2011 were merely sex verification, and they are not afraid to be overt. They don't think that the 2011 rules were just sex verification, and they're not afraid to show it. Their argument is that categories are necessarily parameterized, and that androgens are one possible

parameter, since they are sexually dimorphic, and relevant to strength and muscle development. But this defense is no blank cheque. The authors point out that DSDs do not necessarily bring advantages, that sport cannot make all athletes equal, and that it is the elite athletes themselves who must be at the forefront when it comes to the future of their sport.

The literature of the endocrines is also complex. Hirschberg (2019, 2020) argues that testosterone is a strong contender for a candidate explanation for sex differences in athletic performances and provides evidence concerning androgens and muscle mass, erythropoiesis, lean mass, aerobic performance, and selected competition outcomes. Although not sport policy writers, Sharma and Welt (2021) are significant because in their clinical review they demonstrate the need for careful diagnosis of hyperandrogenism in the normal medical environment. Assay method is important, PCOS is common, hirsutism and androgen excess are viewed in the context of the clinical history and menstrual history and age and ethnicity. It is a good cautionary tale against relying on the use of testosterone as a straightforward identity test.

The legal scholarship is an understanding of fairness that is created, not found. Sudai (2017) says that Testosterone is one of the potential means of fairness but not the only one. By gender identity, by Testosterone, by Lean Body Mass, or by some more complicated set of Advantage Variables, a sport could be classified. Winners and losers are produced in each model. Nguyen (2018) adopts a more rights-based approach, stating that gender verification and testosterone testing are used to discriminate against women, have not been included in anti-discrimination pledges, and could only be perceived as a violation of women's rights.

Proportionality is the link between these two positions that is explored in this paper. Proportionality cannot override the fairness interests of women without DSDs nor can it be used to characterize all eligibility rules as discrimination. It asks if there is evidence to support the rule, and if the rule is designed appropriately. The more serious the consequence, the more carefully the justification must be made; the more serious the consequence, the more elaborate must be the justification. A

The rule, which forces a woman to reveal intimate medical details, repeatedly test herself, inhibit a naturally produced hormone, wait two years, and then risk a losing opportunity at a job calls for a greater reason than an ordinary entry level rule. In this context, the notions of fairness, inclusion and bodily integrity are not pitted against each other. They are values that need to be ordered by evidence, necessity and safeguards.

3. MATERIALS AND METHODS

This study is a written review based upon the doctrine and source-coded approach. The primary corpus consists of eight supplied PDF sources: Karkazis et al. (2012), Hirschberg (2019, 2020), Sudai (2017), Sharma and Welt (2021), Sanchez et al. (2013), Eliakim et al. (2010), and Nguyen (2018). These were considered to be read for Legal claims, Ethical claims, Endocrinological claims, Quantitative values and Regulatory Milestones. Two current official sources were used to complement the review: the World Athletics Eligibility Regulations for the Female Classification (Female Athletes with Differences in Sex Development) 3rd Edition, valid as of 31 March 2023 and the Olympic Charter, as of 24 June 2025.

This paper is not employing athlete-level medical data. It is a matrix of evidence and policies that can be reproduced from the source corpus. Three variables are being coded. First, it is worth noting that the policy chronology contains information on year, governing body, instrument,

threshold of testosterone, scope of application, participation condition and rights concern. Second, all the evidence matrix contains the information on source, design, sample, numerical finding, interpretation, and limitation. Third, the rights-impact matrix assigns a score of 0-3 to each of the six dimensions for each of the major regulatory regimes: sex-specific differential treatment, medical autonomy pressure, privacy/confidentiality risk, due process burden, evidentiary tightness, and participation impact. The score for each burden dimension is from 0 (no burden) to 3 (high burden), with 5 burden dimensions, respectively. Evidential tightness (0 = weak, 3 = strong).

The coding is interpretive and is to be understood as a qualitative assessment, rather than a measure of harm. It has been added so the reasoning of the paper will be auditable. For instance, the 2023 regime imposes a large medical-autonomy burden by requiring athletes to allow no treatment, but then have their eligibility for the sport depend on having testosterone levels below a threshold over time. This is not in the strict sense of the law, but it is a considerable pressure of participation. Likewise, the proposed rights-compatible model would also have high evidentiary-tightness because of the evidence and independent review requirements before exclusion. The coded tables are maintained in spreadsheet format in the data supplement to this paper.

Table 1. Source corpus and evidentiary role

ID	Source	Type	Core use in paper
S1	Karkazis, Jordan-Young, Davis & Camporesi (2012)	bioethics critique	Questions scientific assumptions, policy process, confidentiality, and medical coercion; documents history of sex testing and Semenya case.
S2	Hirschberg (2020)	endocrinology review	Reports normal female testosterone range 0.1-1.8 nmol/L, normal male range 7.7-29.4 nmol/L, PCOS upper female limit up to 4.8 nmol/L, 46,XY DSD prevalence among championship female athletes estimated at 7/1000 versus 1/20,000 general population, and selected sex performance gaps.
S3	Sudai (2017)	law and biosciences analysis	Synthesizes Chand, GH-2000, Daegu and competing views; emphasizes that each fairness model distributes costs and benefits differently.
S4	Sharma & Welt (2021)	clinical endocrinology review	PCOS is the most common cause of hyperandrogenism; LC-MS/MS is preferred for total testosterone; severe biochemical androgen excess thresholds are distinct from sport eligibility thresholds.

S5	Sanchez, Martinez-Patino & Vilain (2013)	sex research commentary	Argues that 2011 threshold was high relative to female means, that DSD is not automatically an unfair advantage, and that elite athletes should play a decisive role in sport policy.
S6	Hirschberg (2019)	endocrinology commentary	Summarizes 2018 rules, a 5 nmol/L threshold, and claimed performance effects in selected middle-distance events.
S7	Eliakim, Marom, Galitskaya & Nemet (2010)	observational adolescent athlete study	In 49 elite adolescent female athletes, 31% had elevated free androgen index; most were asymptomatic.
S8	Nguyen (2018)	international and comparative law note	Frames Olympic Charter, IAAF Constitution and CEDAW arguments; summarizes Chand findings and rights harms.
S9	World Athletics (2023)	official regulation	Version 3.0 approved 23 March 2023, effective 31 March 2023; applies beyond the previously restricted events.

4. Regulatory Trajectory: From Sex Testing to Testosterone Suppression

The management of hyperandrogenism can be best understood in the context of its history as a test of women's fitness. Previous governments have sought sex, visually or by chromosomes. Those methods didn't work because sex doesn't fall conveniently into one ultimate marker. For instance, women who have complete androgen insensitivity syndrome (CAIS) have male levels of testosterone, male chromosomes, but no androgen response, and it would be scientifically and ethically indefensible to classify them as men based on their XY chromosomes or testosterone level alone. The end of universal sex testing didn't stop the suspicion based scrutiny. It changed a universal invasion into a targeted invasion, frequently brought about by appearance, performance, complaints or medical findings.

The policies of the IAAF and IOC in 2011 were not about whether the athlete was a female or not, but whether the athlete with a legal gender was getting too much of an androgenic advantage. The threshold of 10 nmol/L was offered as the edge of the male selection, and the athlete was allowed to compete if he had androgen resistance. Critics argued that the policy still discriminated against women and that it might for some women become a medical requirement to participate. This was exposed during Chand's CAS challenge in 2015. CAS acknowledged that the regulations were discriminatory on their face and therefore demanded that the IAAF provide justification based on scientific evidence that such regulation is required, reasonable and proportionate.

In 2018-2019, the DSD rules were tightened and tightened. They were given to athletes who had a specific 46, XY condition of DSD, with androgen sensitivity and testosterone levels in the male range, but only in limited events ranging from the 400 m to 1 mile. The threshold was lowered to 5 nmol/L. In Semenya's challenge, CAS accepted the rules despite its awareness that they were discriminatory, because they were necessary, reasonable and proportionate to ensure that female

athletics would not lose its integrity in those events. That didn't end the ethical controversy. It shifted the discussion from the charge of discrimination to the question of justification of the discrimination.

The rules of World Athletics are tougher for 2023. The relevant athlete must be legally recognised as female, intersex, have one of the listed DSDs or related conditions, a level of serum testosterone $\geq 2.5\text{nmol/L}$ and adequate androgen sensitivity to exhibit a material androgenising effect. To compete in World Rankings events, the athlete must keep her serum a low level of testosterone of less than 2.5 nmol/L for a period of at least 24 months and persist with this. The regulations clarify that athletes do not have to be medically evaluated or treated and that there should be no anatomical changes of surgery. But in reality, there is no suppression and no World Rankings status for women in the categories.

So the current regulatory framework is limited in its use of consent. The athlete has the right, in a formal manner, to decline. Refusals, in what sense? They turn her away from the category in which she has lived, trained, been legitimized and developed her sporting identity. The rights analysis doesn't end at the word consent; it must include an analysis of what is being consented, what is being sacrificed, and whether there is a less-restrictive means to ensure the protection of the same fairness interest.

Table 2. Regulatory chronology and participation conditions

Year	Body	Instrument	Threshold	Scope / condition	Rights issue
1966	IOC/IAAF	mandatory physical or visual examinations		female athletes in international competition; certification through bodily inspection	humiliation, privacy invasion, sex stereotyping
1967	IOC/IAAF	chromatin or Barr body testing		female athletes; chromosomal screening	misclassified women with CAIS or other variations; public stigma
1992	IAAF	abandonment of routine chromosomal testing		athletics; ad hoc review remained possible	suspicion-based scrutiny continued
1999	IOC	abandonment of universal sex testing		Olympic Games; testing retained in cases of suspicion	gender nonconformity could trigger scrutiny

2011	IAAF/ IOC	hyperandrog enism regulations	10 nmol/ L	female athletes with hyperandrogenism; below male range or androgen resistance	sex-specific rule, medical intervention pressure, confidentiality risk
2015	CAS in Chand	interim suspension of IAAF hyperandrog enism regulations	10 nmol/ L	IAAF rule under challenge; IAAF required to supply further evidence	CAS accepted discriminatory effect and required justification
2018	IAAF	DSD regulations for restricted track events	5 nmol/ L	46,XY DSD athletes in 400 m to one mile events; testosterone below 5 nmol/L for eligibility	narrower diagnosis but stronger medical eligibility pressure
2019	CAS in Seme nya and ASA	upheld DSD regulations as necessary, reasonable and proportionate	5 nmol/ L	restricted events; suppression requirement maintained	acknowledged discrimination but accepted justification
2023	World Athlet ics	C3.6A DSD regulations, version 3.0	2.5 nmol/ L	World Rankings female classification and world records in any event; below 2.5	broader event coverage, longer suppression
				nmol/L for at least 24 months and continuously thereafter	period, consent framed as condition of eligibility
2025	IOC	Olympic Charter		Olympic Movement; sport access without discrimination within Olympic remit	governing bodies must reconcile autonomy with dignity, equality and good governance

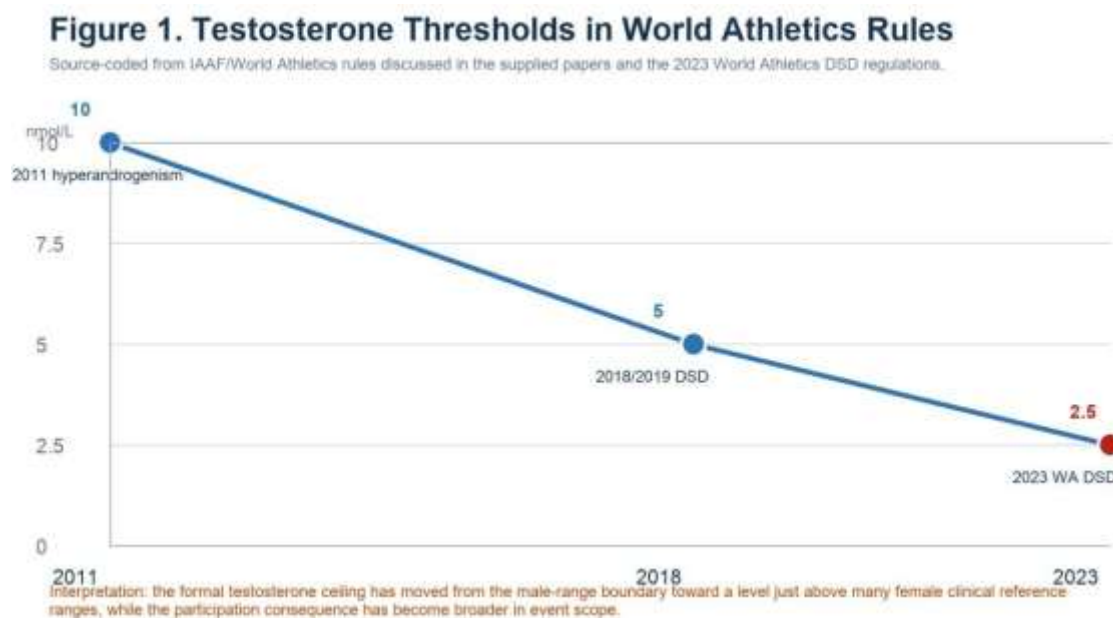


Figure 1. Testosterone thresholds in World Athletics-linked eligibility regimes.

5. Scientific Evidence and Its Limits

The first indication that hyperandrogenism might need regulation comes with the overall performance difference between top male and female athletes. Hirschberg (2020) reports selected Rio 2016 gold-medal differences of 8.4% in the 100 m, 9.6% in the 5000 m, 17.2% in high jump, 19.6% in pole vault and 26.7% in javelin. The values are not conclusive evidence of an unfair advantage to any specific woman with DSD, but are a reflection of the reason why a female category is protected in many events. This single open category would lead to a dramatic decrease of the chances of women to win medals, obtain sponsorship, be selected and to receive symbolic recognition in many sports.

The next step is more difficult: transitioning from aggregate sex differences to a single biochemical rule. Testosterone is relevant. It may stimulate erythropoiesis, influence haemoglobin, increase muscle mass and influence some performance-related variables, and affect lean mass. Hirschberg (2020) summarized the results of a randomized trial where 48 physically active women aged 18 – 35 were treated with testosterone cream or a placebo for 10 weeks, accompanied by an increase in mean serum testosterone of 4.3 nmol/L, a 8.5% improvement in endurance time to exhaustion, and a 2.0% increase in lean mass, in the treatment group. That's significant data showing that moderately high exogenous testosterone can impact the performance-related metrics in women. Relevance is not decisive. The RCT is not concerned with endogenous DSD athletes under elite pressure, but rather with exogenously administered athletes that are healthy and physically active. Observational studies also have complex questions. The Daegu data reported by Sudai (2017) reported median testosterone levels of approximately 0.69 nmol/L in elite female athletes; only three women had testosterone levels higher than 10 nmol/L, but this was interpreted as indirect evidence that there is an advantage. There is controversy regarding the implications of those numbers from the GH-2000 study discussed by Sudai and Nguyen, due to the importance of the time of the sample, the type of assay, and the variations and exclusion criteria in the study.

This is heightened by the clinical endocrinology. Sharma and Welt (2021) note that total testosterone is sensitive to the assay method, prefer the use of liquid chromatography/mass

spectrometry, and that common causes include the diagnosis and treatment of PCOS is unique. According to Hirschberg (2020), normal women values are reported as 0.1-1.8 nmol/L, upper values for PCOS are up to 4.8 nmol/L and values for men are 7.7-29.4 nmol/L. Therefore, a threshold of 2.5 nmol/L is not just the previous threshold for males. It is in a territory where there are clinical, athletic and regulatory meanings.

The scientific evidence is consistent with a limited proposition: androgen exposure can have an impact on performance, and in a few cases it could have a significant impact such that regulation is warranted. It does not justify excluding any athlete from any event because of any level of serum testosterone, when it is not accurate enough to define unfair advantage. Those propositions are different only in terms of a defensible policy inquiry and an overbroad rule.

Table 3. Evidence matrix: selected quantitative findings and limitations

Source	Design / sample	Numeric finding	Use and limitation
Eliakim et al. 2010	observational hormone screening; 49 elite adolescent female athletes	31% elevated free androgen index; most asymptomatic	Mild hyperandrogenism may be overrepresented in elite athlete samples. Limitation: Small, sport-mixed sample; FAI is not a direct eligibility measure.
Bermon et al. 2014 as discussed by Sudai 2017 and Hirschberg 2020	elite championship hormone profile; 839-849 female athletes, depending on exclusion handling	Median testosterone about 0.69 nmol/L; 3 athletes above 10 nmol/L in Daegu data	Very high endogenous testosterone is uncommon but present in elite female cohorts. Limitation: Prevalence cannot prove performance causation.
Healy et al. 2014 as discussed by Sudai 2017 and Nguyen 2018	post-competition endocrine profiles; 693 elite athletes	16.5% men below 8.4 nmol/L; 13.7% women above 2.7 nmol/L	Elite athlete hormone profiles may overlap more than ordinary clinical reference ranges imply. Limitation: Post-competition timing and cross-sport sample complicate policy use.

Hirschberg 2020	review of testosterone reference ranges; clinical and sport literature	Female 0.1-1.8 nmol/L; PCOS upper values up to 4.8 nmol/L; male 7.7-29.4 nmol/L	A 2.5 or 5 nmol/L sport threshold sits above typical female range but below usual male range. Limitation: Ranges are population summaries, not individual performance predictions.
Hirschberg 2020	review of 46,XY DSD prevalence; general population and World Championship athlete estimates	46,XY DSD estimated 1/20,000 births generally versus 7/1000 among female World Championship athletes	Suggests possible selection or performance association in elite sport. Limitation: Rare-condition estimates and ascertainment may be uncertain.
Hirschberg et al. RCT summarized	double-blind randomized trial; 48 healthy	10 weeks testosterone cream raised mean	Moderate exogenous testosterone can improve some
in Hirschberg 2020	physically active women aged 18-35	testosterone from 0.9 to 4.3 nmol/L; endurance time to exhaustion improved 8.5%; lean mass increased 2.0%	performance-related outcomes in women. Limitation: Exogenous treatment and recreationally active sample do not directly settle endogenous DSD eligibility.
Bermon/Hirschberg performance studies summarized in Hirschberg 2019/2020	elite athlete androgen-performance correlations; more than 1000 elite female participants across championships	Highest testosterone tertile showed 2.1-2.5% better performance in selected 400 m, 400 m hurdles and 800 m events	Supports event-specific performance association claim used by regulators. Limitation: Observational correlation; publication and analysis controversy remain.

Hirschberg 2020 Table 2	2016 Olympic gold-medal performance comparison; selected events at Rio 2016	Women-men sex difference: 100 m 8.4%, 5000 m 9.6%, high jump 17.2%, pole vault 19.6%, javelin 26.7%	Sex category separation has a performance rationale in many events. Limitation: Aggregate sex gaps do not identify the proper rule for atypical female bodies.
----------------------------	---	---	--

Figure 2. Selected Sex Performance Gaps at Rio 2016

Values are percent differences between women and men Olympic gold medal performances reported in Hirschberg (2020), Table 2.

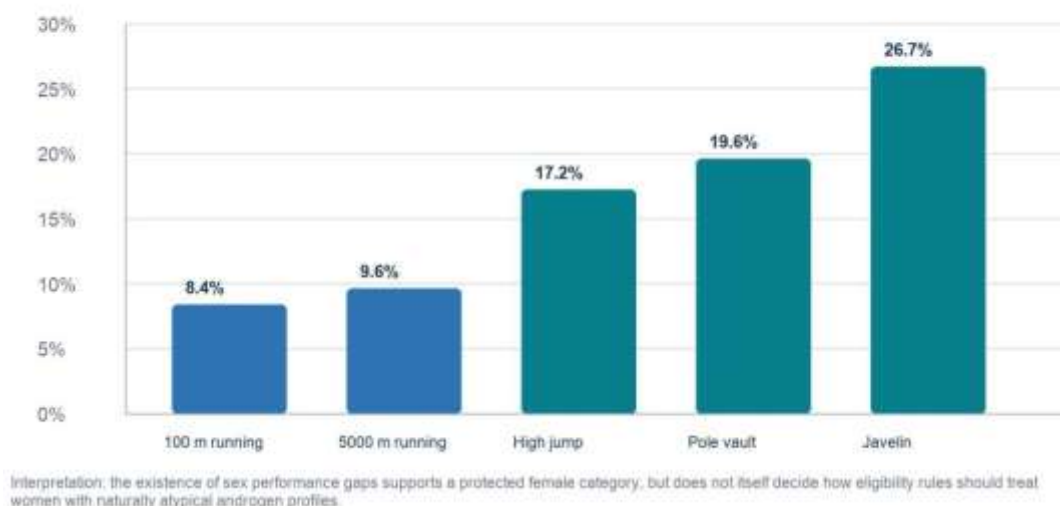


Figure 2. Selected sex performance gaps reported by Hirschberg (2020).

6. Participation Rights and the Burdens of the Rule

There are formal and material aspects of the right to participate in sport. In terms of strict rules, a woman is allowed to play in local, national or non-ranking competitions even if she is not played in World Rankings events. Elite sport is a rare form of career structure in terms of materiality. World Rankings competitions dictate selection, money, sponsorship, records, national prestige and the perception of being an elite athlete. Being barred from that route is no trivial matter. The suppression requirement can be a critical element of a competitive career for athletes with short and event specific careers.

First burden is discrimination. Hyperandrogenism is not a condition that affects men who have unusual biological benefits, it only affects a subset of women. If it is differential treatment in the sense that it is being done to benefit the female category, then it is okay, but still differential treatment. CAS in Chand did this by transferring the burden of proof to the federation to demonstrate necessity and proportionality. That burden should be retained in a rights-compatible analysis. It is the obligation of the federation – not the individual athlete – to demonstrate the reasons why this is only regulated, whereas others are celebrated.

The second burden is that of bodily integrity and medical autonomy. According to World Athletics, athletes are never forced to receive treatment and that having surgical changes to the anatomy is not a requirement. Those are important safeguards given past experiences of examinations of the genitals and interventions for no medical reasons. However, the condition of eligibility that requires

athlete hormone suppression keeps sport governance in the athlete's body. Typically, the goal of medical treatment is to promote the patient's best medical interests. In this instance, treatment may be sought for the purpose of meeting an eligibility criterion. That inversion could become a situation that leaves doctors deciding on the categories in which athletes will participate and athletes becoming patients for the sake of institutional fairness.

Privacy is the third burden. The condition of having DSD is highly confidential, as is fertility, gonadal anatomy, androgen sensitivity, genetic information and hormone values. It is possible even a confidential process can be "made public" when an athlete is missing from competition or provisionally suspended or is known to be violating the rules. Karkazis et al. (2012) are correct that confidentiality is "admirable" but "fragile. A policy which could be used as a wedge into the individual, through appearance, grievances or even if a person is a bit muscular or just dominant, is likely to be the subject of whispers, particularly against the gender nonconforming, racialised women.

Due process is the fourth burden. For affected athletes, it is technically difficult and complex, because there is an unequal application of resources and protocols; an international dimension regarding the arbitration; and the 'real-world' situation of continuing to train while wondering whether they will be eligible for competitions. There is also an ombudsperson provision and expert panels, but there needs to be an independent review, access to evidence, clear reasons, rights of appeal and safeguards against provisional suspension that stops the case before it is heard, if a person is to have due process. The European human-rights case against Semenya, including the account of the Grand Chamber judgment in 2025, is an illustration of the need for painstaking judicial scrutiny in cases of career-ending sanctions for private sport arbitration.

These burdens do not automatically preclude regulation. They do change the standard of justification. A rule that asks a woman to alter her endocrine profile for the sake of eligibility should be supported by event-specific, contemporary and independently reviewed evidence; it should be limited to the events where the advantage is demonstrated; and it should provide alternatives where possible, such as open classifications, transitional eligibility, or individualized review that does not default to exclusion.

Figure 3. Source-Coded Rights Impact Scores

Ordinal coding by the author from the supplied literature and official rules: 0 = no or minimal burden, 3 = high burden. Evidentiary tightness is reverse-coded, where 3 means strongest tailoring.

Regime	Sex-specific treatment	Medical autonomy pressure	Privacy/confident risk	Due process burden	Evidentiary tightness	Participation impact
2011 hyperandrogenism rules	3	3	3	2	1	3
2015 Chand suspension	2	1	1	1	2	1
2018/2019 restricted-event DSD rules	3	3	2	2	2	3
2023 World Athletics DSD rules	3	3	2	3	2	3
rights-compatible model proposed here	1	0	1	1	3	1

Coding note: the proposed model scores lower on autonomy and participation burdens because it rejects treatment-as-eligibility unless medical care is independently indicated and chosen by the athlete.

Figure 3. Interpretive rights-impact scoring across regulatory models.

7. Toward a Rights-Compatible Regulatory Model

A workable model should begin by rejecting two extremes. The first extreme says that fairness allows governing bodies to regulate any atypical female body whenever they suspect advantage. That approach repeats the history of sex testing and invites the policing of femininity. The second extreme says that because all elite athletes are biological outliers, no sex-linked eligibility rule can ever be justified. That approach understates the institutional importance of the female category for women's access to elite sport.

A well-designed proportionality test is the better model. The first step is legitimacy – the federation must be able to state the aim clearly. The preservation of meaningful competition for women is a valid thing, but the preservation of comfort in the classic feminine role is not. Step two is evidence: the federation should establish a sound connection between the regulated trait and material advantage in the particular event or event family. Scientific views that differ from the consensus need to be recorded and not buried, and should be reviewed from time to time by independent experts. The third step is necessity, which the federation has to demonstrate that other less restrictive methods will not protect the category. The lower threshold / longer suppression period should not be considered to be adopted simply because it is administratively cleaner.

Medical independence is Step Four. A health evaluation should not be part of any eligibility enforcement. The responsibility of the athlete's treating clinician should be towards the athlete and not towards the federation. It should be provided as care when indicated by medical need. Treatment should not be used to meet eligibility requirements simply as a cover for care if it is not medically necessary. The athlete should be given independent advice concerning side effects, fertility, mental health, and long term monitoring and alternatives. Sport bodies should not exploit the issue that a need for a sport career is a health requirement.

Procedural fairness is step 5. Except in urgent situations, athletes should be excluded only following written reasons, access to non-confidential evidence, funding for support, if necessary, independent representation, and a meaningful appeal before exclusion, that should be selected by athletes with confidence. The use of provisional suspension is to be used sparingly as this can destroy the confidentiality and cause the harm before the merits are considered.

Anti-stigma design is the sixth step. Appearance-based complaints, bad faith reporting and disclosure of media reports, and such bans should be followed by concrete repercussions. The outcome of a competition should not include information that the athlete is DSD-affected. Collection and storage of data should be kept to a minimum and stored securely and deleted if not needed. Finally, athletes affected by the rules should have seats in the policy process. Women's participation rights cannot be protected by a governance model in which the most affected women are merely case files.

Table 4. Proposed proportionality standard for rights-compatible eligibility regulation

Step	Question for regulator	Minimum safeguard
Legitimate aim	Is the rule protecting meaningful female competition rather than policing appearance or identity?	State aim in writing and prohibit appearance-based complaints.

Event-specific evidence	Is the advantage demonstrated in the actual event or event family?	Independent review, publication of evidence summary, periodic reassessment.
Necessity	Is there a less restrictive way to protect the category?	Evaluate open category, narrower event scope, transitional measures and individualized review.
Medical independence	Is care separated from eligibility enforcement?	Athlete-selected clinician, informed consent, side-effect counseling and no medically unnecessary intervention.
Due process	Can the athlete contest facts and interpretation before exclusion?	Reasons, access to evidence, representation support, ombudsperson and appeal before sanction where possible.
Privacy and anti-stigma	Does the process protect intimate information and dignity?	Data minimization, confidentiality sanctions, no public labeling and secure deletion rules.

8. DISCUSSION

The central difficulty is that both sides of the debate identify a real harm. Women without DSDs may reasonably fear that a female category without any boundary around male-puberty or male-range androgen effects would become less meaningful in some events. Women with DSDs reasonably experience current rules as exclusion from the category that matches their legal identity, social life and athletic development. The task of law and ethics is not to declare one harm unreal. It is to decide what evidence and procedure are required before one group of women bears the cost of protecting the opportunities of another.

The data assembled here suggest that the current World Athletics approach is too categorical in at least one respect: event scope. The earlier rules were controversial but at least tied to a specific event band where World Athletics claimed its strongest evidence. The 2023 rules remove the concept of restricted-events. If the scientific response is event-sensitive, so should be the regulatory response. Universal event rule necessitates universal event evidence or, at least, a publically reasoned explanation of how it was extrapolated. Otherwise the expansion is administratively a no-brainer, but it is scientifically harmless.

The level of 2.5 nmol/L also needs to be closely monitored. It might be justified as getting athletes nearer to normal women ranges, but sport is not normal. Elite sport relies upon abnormal body. The discomfort with atypicality should not be the reason for a threshold, but the performance effect. The same applies to length of time. If there is evidence to support that androgen-linked advantages continue after suppression for a 24-month period, then that is a defensible length of time, but the burden of proof must be clear as the practical effect is great.

The analysis also indicates the reason for the need to use with care the term women's right to participate. The act of participation is not just about entering into any and all competitions. It encompasses a level playing field on the access to the mechanisms by which athletic excellence is rewarded. Compete in male (open) category may not be allowed if a rule permits an athlete to

compete in a male (open) category.

If there's no such category, if it's a less prestigious one, or if it's one in which she has a much smaller performance edge, it's not a comparable prestige to meanfully preserve her right. Likewise, it seems that providing national level participation, but not World Rankings competition could maintain recreational access, but not elite participation.

Last but not least, the emphasis of this paper is on improving data. Language does not settle the controversy. Transparent event-specific analyses, independent replication, athlete health outcomes following suppression, privacy harms, effect of provisional suspensions on careers, and the perspective of athletes and their competitors affected by the suppression should be included in future research. A high-quality evidence base won't solve the ethical issue, it would just make the uncertainty in the science smaller, and the precision of the rule greater.

9. CONCLUSION

Hyperandrogenism regulations are requesting that sport make a choice as to how much natural biological variation can be accommodated in the female category. The answer is not that all variation is acceptable in all contexts, since sex categories are there to give women meaningful opportunities in events where there are big performance gaps due to the physical development that is male-dominated. But at the same time the answer can't be that women with naturally abnormal androgen profiles are obligated to "normalise" themselves for sport, because that is what would really be absurd.

A rights-compatible rule should be narrow, evidence-based, medically independent, procedurally fair and be confidential. It should be a method in which athletes with a condition are seen as equal to women rather than a threat to a category. New sport-sexing rules are an improvement on previous sport-sexing in a few ways: no surgery is required, legal status as a female or intersex is explicitly acknowledged and duties for dignity and anti-harassment are included. However, the lower threshold, all-event scope, and suppression period for 24 months further heighten the importance of justification. Without additional specific evidence and protections, those features may become a "fairness trap".

Proportionality thus emerges as the most sustainable solution to avoid both the elimination of the category of women and automatic hormone regulation. Proportional solutions consist of protecting women's sports and requiring the governing bodies to demonstrate that a certain individual has to be excluded from this protection. Exceptional bodies are normal in elite sports, and regulation is justified only when it is able to substantiate, through evidence, why certain exceptions cannot coexist with fairness while other exceptions define excellence itself.

Data Availability Statement

The corresponding workbook includes the source corpus table, regulatory chronology, evidence matrix and rights impact coding that have been utilized to construct the tables and figures in this draft. The data are derived from literature and regulation coding. No private athlete medical data or athlete-level biological testing has been conducted.

REFERENCES

1. Associated Press. 2025. Olympic champ Semenya did not get a fair hearing in sex eligibility case, human rights court rules. AP News, July 10, 2025.
<https://apnews.com/article/94f47afe56462d4b4d85a804448e3ee5>
2. Eliakim, A., Marom, N., Galitskaya, L., and Nemet, D. 2010. Hyperandrogenism among elite adolescent female athletes. *Journal of Pediatric Endocrinology & Metabolism* 23:755-758. doi:10.1515/jpem.2010.124.
3. Hirschberg, A. L. 2019. Hyperandrogenism in female athletes. *Journal of Clinical Endocrinology & Metabolism* 104(2):503-505. doi:10.1210/jc.2018-01676.
4. Hirschberg, A. L. 2020. Female hyperandrogenism and elite sport. *Endocrine Connections* 9:R81-R92. doi:10.1530/EC-19-0537.
5. International Olympic Committee. 2026. Olympic Charter. In force as from 24 June 2026. <https://stillmed.olympics.com/media/Documents/International-Olympic-Committee/IOC-Publications/EN-Olympic-Charter.pdf>
6. Karkazis, K., Jordan-Young, R., Davis, G., and Camporesi, S. 2012. Out of Bounds? A critique of the new policies on hyperandrogenism in elite female athletes. *American Journal of Bioethics* 12(7):3-16. doi:10.1080/15265161.2012.680533.
7. Nguyen, A. B. Y. 2018. Fairness at a Price: Protecting the integrity of athletic competitions at the expense of female athletes. *Notre Dame Journal of International & Comparative Law* 8(1), Article 8. <https://scholarship.law.nd.edu/ndjicl/vol8/iss1/8>
8. Sanchez, F. J., Martinez-Patino, M. J., and Vilain, E. 2013. The new policy on hyperandrogenism in elite female athletes is not about sex testing. *Journal of Sex Research* 50(2):112-115. doi:10.1080/00224499.2012.752429.
9. Sharma, A., and Welt, C. K. 2021. Practical approach to hyperandrogenism in women. *Medical Clinics of North America* 105(6):1099-1116. doi:10.1016/j.mcna.2021.06.008.
10. Sudai, M. 2017. The testosterone rule - constructing fairness in professional sport. *Journal of Law and the Biosciences* 4(1):181-193. doi:10.1093/jlb/lbx004.
11. World Athletics. 2023. Eligibility Regulations for the Female Classification (Athletes with Differences in Sex Development), Version 3.0, approved 23 March 2023 and effective 31 March 2023. <https://worldathletics.org/news/press-releases/council-meeting-march-2023-russia-belarus-female-eligibility> and <https://www.worldathletics.org/download/download?filename=2ffb8b1a-59e3-4cea-bb0c-5af8b690d089.pdf&urlslug=C3.6A%20-%20Eligibility%20Regulations%20for%20the%20Female%20Classification%20-%20effective%2031%20March%202023>