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A netnography and a survey on doping use among competitive doping-untested strength-sport athletes

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ABSTRACT

Doping-untested strength-sport athletes (powerlifters, strongmen, armlifters, etc.) are infamous for their doping use, but their exact doping regimens are not known. The purpose of this study was to provide a reasonable portrait of doping history in this specific athlete group for medical practitioners. 75 athletes were chosen by netnography of the social media community around the Finnish doping-untested strength-sport federations on the basis of their activity in doping-related discussions, and the athletes were invited to answer a detailed doping-related anonymous survey. 50 respondents completed the survey. 100% of the respondents reported use of anabolic androgenic steroids, 66% reported use of stimulants, and 80% use of non-steroidal anabolic substances. The doses of both testosterone products and human growth hormone were notably larger than reported in previous studies among gym users (mostly non-competitive athletes). The subjects reported simultaneous use of an average 5.66 illegal substances, and lifetime use of 16.78 illegal substances. The doses of illicit drugs, as well as polypharmacy, among competitive doping-untested strength-sport athletes are higher than previously reported among recreational gym users, and side effects are likely in this specific population.

Key words

Doping, anti-doping, anabolic androgenic steroids, AAS, human growth hormone, HGH

INTRODUCTION

Doping can be defined as using substances and methods forbidden by the World Anti-Doping Agency[1]. Among doping-untested strength athletes, doping is seen as drugs and treatments used to improve athletic performance, and medical treatments prescribed by a medical practitioner for other purposes are not seen as doping, even if they are on the WADA prohibited products list.

Anabolic androgenic steroids (AAS) are the main ergogenic agents of abuse[2]. The hepatic, cardiovascular, reproductive, and psychiatric side effects of AAS are well known[3–5]. AAS abusers are mostly aware of the side effects, but find the use of these drugs inevitable for success in sports[6–12].

Gym users have been reported to use almost 30 times the recommended doses of injectable AAS[6,7]. Doping-untested competitive strength athletes, including powerlifters, strongmen, armlifters, etc., are infamous for their doping substance abuse[5,13,14], but their exact doping regimens are not known. Most of the previous doping-related surveys have been conducted among recreational gym users[6,7,9–12,15], and the difference in the doping use pattern among competitive doping untested athletes and recreational gym users is likely prominent. The aim of this study was to provide qualitative information on doping substance abuse among the so called heavy users, here limited to doping untested strength sport athletes.

The medical science community does not know, what products and amounts of doping substances the so called heavy users use, and there is no timely research about this issue. Respectively in the case of narcotics for example, the similar knowledge is seen valuable. Considering the acute and long term health consequences of heavy doping substance abuse, the health care practitioners should be provided with some objective measures of the phenomenon they are dealing with. Medical doctors are also the main professionals to be consulted, when information on doping substance abuse is needed by other authorities, like the police or the customs.

METHODS

Netnography for choosing the subjects for the survey

Finnish doping-untested strength-sport federations (Finnish pro powerlifting federations, Finnish strongmen group, and Finnish doping-untested armlifting federations) have a common devoted

social media community formed around them. The number of members in the social media groups in question is many thousands, but about 200–300 who are active. It was regarded as potentially harmful for the social media community to publish an open survey containing detailed questions of doping use. Thus, the study population needed to be limited to those members of the social media community who seemed to be open to doping-related discussion.

Netnography[16,17] is an unobtrusive observational method for researching online communities. Netnography was used to choose the actual study population for the survey. The social media community around the Finnish doping-untested strength-sport federations was searched for members who were active in doping-related discussion or posted doping-related comments in unrelated discussion threads.

Which social media comments were regarded as doping-related was a somewhat subjective matter for the researchers. For example, discussion about testosterone replacement therapy (prescribed by a doctor) was not regarded as doping-related, even though testosterone products are WADA prohibited drugs. They are not prohibited in the sports federations in question, and pure replacement therapy is not for performance-enhancing purposes. By contrast, mentioning black market (illegal) testosterone products in a thread on testosterone replacement therapy was regarded as doping-related.

The survey was also meant only for competitive strength-sport athletes, to show if their doping use differs from previously researched recreational gym users. Thus, the social media members commenting about doping were followed to their personal social media pages, and the pages were checked for clear competition-related posts. Most of the commenters active in doping-related discussions were well-known top-achieving athletes of the sports federations in question. Where unclear, the person was contacted with a personal message asking if they compete in the sport federations in question, before including him or her in the study population. Only one person needed to be questioned about this.

Questionnaire

A doping-related anonymous web-based questionnaire was sent to 75 athletes chosen in the first part of the study, described above. No personal details, not even IP addresses, were collected. By the Finnish Law of Medical Research (488/1999), an anonymous survey without clinical intervention does not need approval by the local ethics committee. This study meets international ethical standards.[18]

A questionnaire of 29 questions was used to collect detailed doping history of the respondents, with special attention given to anabolic androgenic steroid use. The only background information collected was gender – exact demographic information would compromise anonymity in such a limited study population. Anonymity was regarded as the single most important feature in a questionnaire about such a private issue as doping. Non-doping users were asked not to answer the questionnaire. Our aim was specifically to research the doping culture among users, instead of the whole doping-untested strength-sport society. Moreover, it was regarded as harmful to the sports federations in question to publish any numbers on the prevalence of doping, so the study population was limited to users.

Statistical analysis

This study is completely descriptive. The statistical analyses were made using Jamovi software for Windows PC, as well as Microsoft Office Excel.

RESULTS

50 of the invited 75 persons answered the survey; the response rate was 66.67%. 84% of the respondents were men and 16% women. No demographic information was collected.

100% of the respondents had used AAS. 94% had used testosterone products, 94% injectable synthetic steroids, and 92% oral synthetic steroids. Number of users by specific AAS product is shown in **Figure 1.**

66% of the respondents had used stimulants (ephedrine or amphetamine – no respondents reported using cocaine). 44% had used diuretics (mainly furosemide). 80% had used non-steroidal anabolic compounds, including clenbuterol, human growth hormone (HGH), insulin-like growth factor (IGF), insulin, selective androgen receptor modulators (SARMs), etc. 68% had used anti-estrogenic post cycle therapy (PCT). The number of users per specific (non-AAS) product is shown in **Figure 2.**

Testosterone was mainly used as a mixture of different esters, and the users spontaneously reported the summed dose of different testosterone products per week (even though the doses of the specific products were asked in the questionnaire). The average dose was 1044 mg per week. The most commonly used synthetic AAS, nandrolone decanoate, was used at an average of 473.3 mg per week. The average dose of HGH was 6.5 IU per day. The average doses (and their standard deviations) of all specific products are listed in **Table 1.**

The average steroid cycle length was 20.14 weeks (SD 12.38), with replacement therapy dose times not calculated into the cycle. The average break from steroid cycle was 10.82 weeks (SD 5.64). 44% of those answering reported also using steroids during the break, mostly with a replacement therapy dose. 58% of respondents switched between different AAS products during the cycle. 80% went up in the doses during the cycle. 22% tapered the cycle down gradually (went down in the doses during the cycle). Different steroid cycle strategies are shown in **Figure 3A.**

The respondents reported using, on average, 5.66 (SD 2.48) doping products simultaneously. The respondents had tried an average of 16.78 (SD 7.63) different doping products.

The steroid users most often got information about doping methods from other users (88%). Other information sources were the internet (64%), books (42%), trainers (30%), and doctors (30%). Information sources are shown in **Figure 3B.**

DISCUSSION

Mostly the same familiar doping substances were used as in previous studies[6–9,12].

In this study we found that the doses used were larger than in previous studies [6–9,12]. Most of the substances are bought through the black market, since most anabolic agents and doping substances are not available in Finland from a medical practitioner and are not even pharmacy products. That in itself might create a phenomenon of "mislabelling", where the manufacturer labels the products mostly to contain more of the active compound. Therefore even the users cannot be sure about the dose they are using. This might partly explain the increased doses from previous studies.

The average dose of testosterone per week found in this study, 1044 mg, is about double compared to earlier published numbers[6], but this figure includes all testosterone products summed, whereas earlier either single compounds or the dose of a premixed product have been published. Still, taking into account that 16% of the respondents in this study were women, the average testosterone dose of 1044 mg per week is likely higher than the numbers from dosing in the earlier era. The doses of the synthetic AAS were similar to, or only slightly higher than, what was published earlier[6].

The doses of HGH reported in this study were concerningly higher than what has been published earlier[19,20]. The difference in the doses might be partly due to the fact that in the US (where the previous studies have been conducted), the abused HGH is sometimes prescribed by a clinical practitioner for off-label use[20], and the doses are thus close to the recommended replacement therapy doses. Also regarding other doping products, the doping culture in Finland is likely closer to

the doping culture in neighbouring Russia than that of the US. The HGH use was much more common than earlier reported (64 % compared to 2,7 % of the steroid users reported in 1997[15]). HGH products have likely become more accessible for the abusers after the 90's, as the recombinant HGH products were still relatively new in the 90's.

Severe polypharmacy was found in this study, with average lifetime use of 16,78 different doping products, and up to 30 different doping products. That might result in increased and unpredictable side effects.

Some of the participants reported the style of steroid cycling mostly referred to as "Blast & Cruise". That means steroid cycling where the user does not come off the drugs completely between cycles, using mostly a replacement therapy dose of testosterone in between. This is a relatively new trend among steroid abusers, as steroid breaks were earlier thought to prevent tolerance to steroids[7].

Designer drugs and pre-clinical phase drugs were used to some extent, but were not common – they might be more popular among doping-tested athletes, since they are not as easily detected in doping tests as more popular doping substances. Since the new doping substances are not as much researched, the side effect profile is quite unknown. The use of these kinds of substances might increase the risk of health consequences among athletes.

In Finland, doping is a silent problem, and athletes are unlikely to discuss doping use with clinical practitioners. A more open atmosphere regarding doping in general might make it easier for clinicians to control athletes' doping use, at least to some extent.

Doping is a universal problem, and modern-day doping users have limitless access to information about doping on the internet. Thus, many of the doping use trends seen in this study, like the rising doses of anabolic androgenic steroids, and the "Blast & Cruise" phenomenon, are likely not only local trends in Finland. We can speculate that the high HGH doses abused by Finnish athletes may be common in the Eastern Bloc countries, unlike in the US, but this issue requires further research.

Study design

Response rate could not be assessed precisely, as non-doping users were asked not to answer, and the rate of answers presents merely an estimate of the response rate. Duplicates were possible, and could not be assessed, as no IP addresses were collected. No two similar answers were seen, though, which argues against duplicate answers.

CONCLUSIONS

Clinical practitioners may encounter doping-untested strength athletes because of doping side effects, infertility, and need for testosterone replacement therapy after stopping steroid use, etc. Knowledge of doping substance abuse is also needed in co-work with the police, customs, and other authorities in the case of illicit drugs of abuse. Our results show that among competitive doping-untested strength athletes, high doses of doping substances are abused, and several drugs are abused simultaneously. This athlete group might be more likely to develop side effects from doping substances than recreational gym users.

At our prediction, some behaviours that stood out from the data might indicate some of the common psychological features among doping-untested strength athletes. Serious polypharmacy, unwillingness to come off between steroid cycles, and the willingness to use pre-clinical phase substances might indicate that the users are prone to addictive behaviour regarding other substances as well[6,9]. Interestingly, only a few respondents reported use of amphetamine or opiates, and no respondents reported use of cocaine, unlike in earlier studies among recreational gym users[9]. This might be related to the highly planned nature of doping use among competitive athletes.

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FIGURES AND TABLES

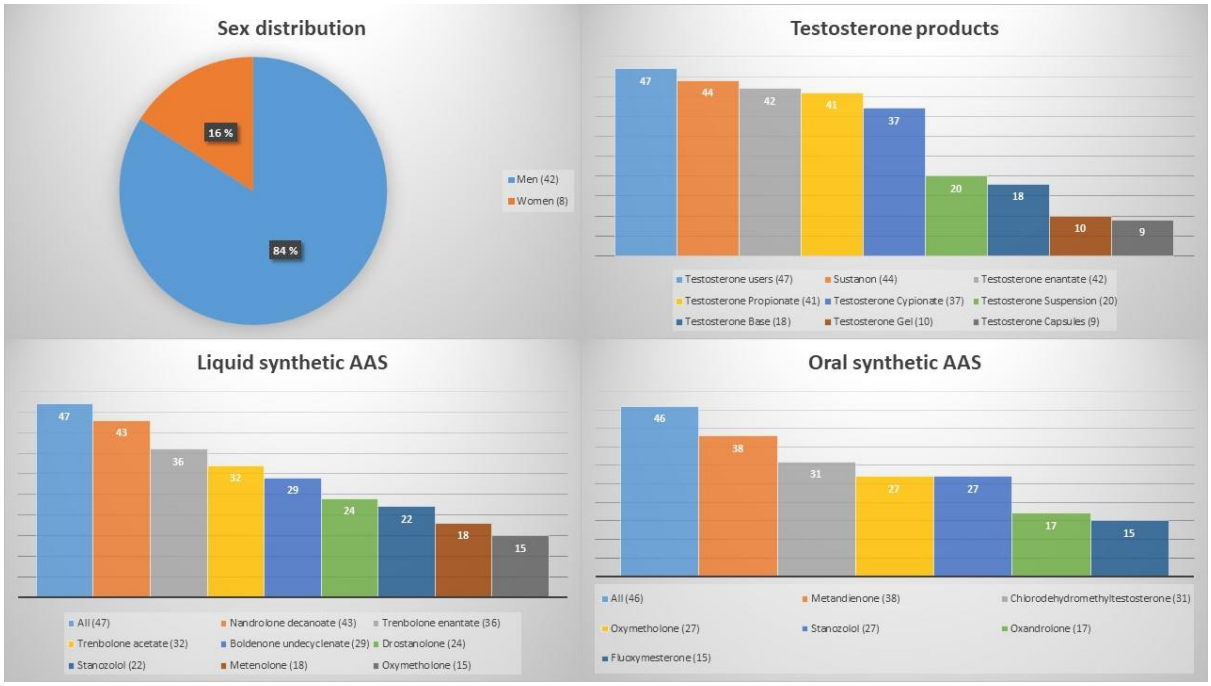

Figure 1A-D. Sex distribution of the respondents (1A), and number of self-reported users per specific AAS product, divided into testosterone products (1B), injectable synthetic AAS (1C), and oral synthetic steroids (1D).

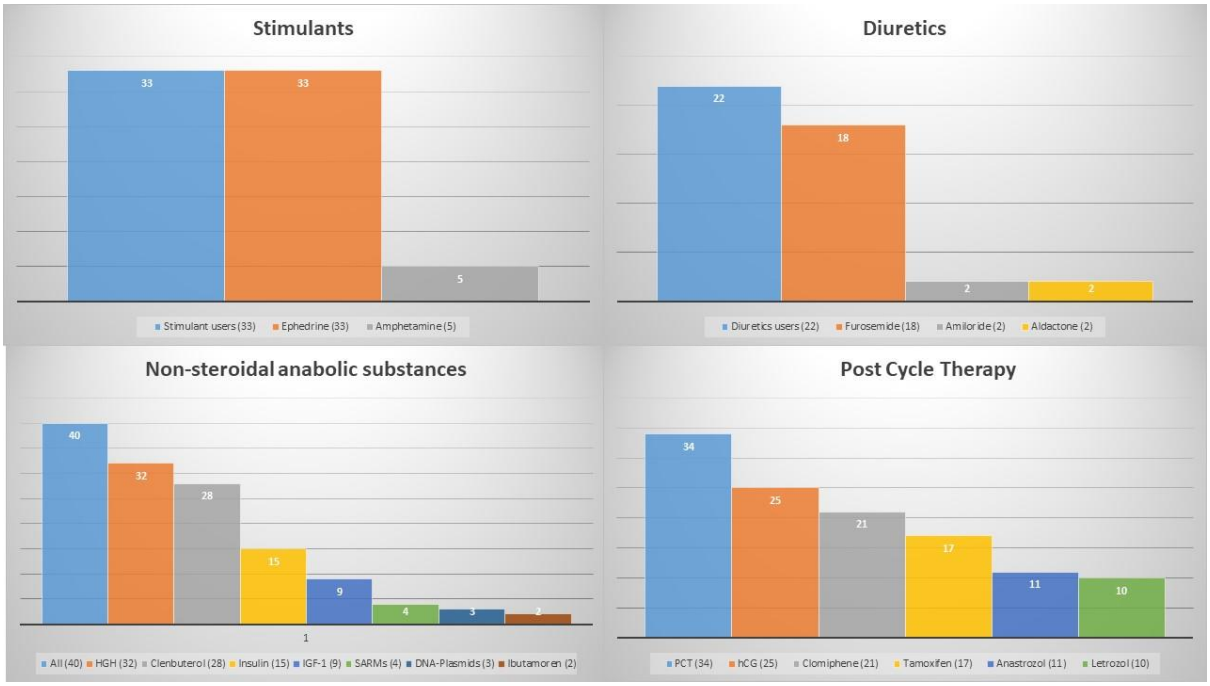

Figure 2A-D. Number of self-reported users per specific doping product excluding AAS, divided into stimulants (2A), diuretics (2B), non-steroidal anabolic substances (2C), and post-cycle therapy (2D).

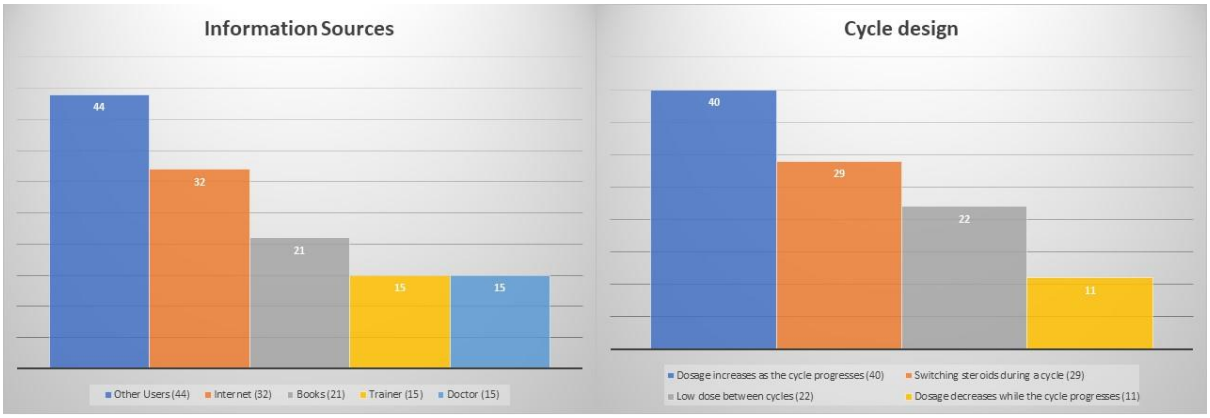

Figure 3A-B. Different steroid cycle strategies and number of users per strategy (3A), and different doping-related information sources (3B).

Table 1.

	Stimulants	
Substance	**Average Dose**	**Standard Deviation**
Ephedrine	82,9mg/day	64,7mg/day
	Diuretics	
Substance	**Average Dose**	**Standard Deviation**
Furosemide	149mg/day	153mg/day
	Non-steroideal Anabolic Substances	
Substance	**Average Dose**	**Standard Deviation**
Clenbuterol	69,3mcg/day	40,0mcg/day
Human Growth Hormone	6,5 iu/day	3,5 iu/day
Insulin	21,3 iu/day	19,0 iu/day

	Testosterone	
Substance	**Average Dose**	**Standard Deviation**
Testosterone	1044mg/Week	585mg/week
	Liquid synthetic anabolic steroids	
Substance	**Average Dose**	**Standard Deviation**
Boldenone Undecyclenate	312,5mg/week	229,5mg/week
Drostanolone	514,3mg/week	296,8mg/week
Metenolone	250mg/week	70,7mg/week
Nandrolone Decanoate	473,3mg/week	275,7mg/week
Oxymetholone	150mg/week	70,7mg/week
Stanozolol	320mg/week	135,1mg/week
Trenbolone Acetate	350mg/week	137,8mg/week
Trenbolone Enantate	415mg/week	270,9mg/week
	Oral synthetic anabolic steroids	
Substance	**Average Dose**	**Standard Deviation**
Chlorodehydromethyltestosterone	37,5mg/day	18,3mg/day
Fluoxymesterone	22,5mg/day	3,5mg/day
Metandienone	47,8mg/day	20,1mg/day
Oxandrolone	43,3mg/day	49,3mg/day
Oxymetholone	90,6mg/day	48,1mg/day
Stanozolol	62mg/day	50,7mg/day

Table 1. Average doses and standard deviations of different doping products, reported by 50 doping users.

SUPPLEMENTARY MATERIAL

Questionnaire of doping use for doping-untested strength sport athletes

(This internet survey was conducted in June 2019 and has been freely translated from the Finnish language into English.)

This questionnaire is meant for doping users. If you do not use doping products, please do not answer the questionnaire.

By answering you help create qualitative knowledge of doping products and their use for medical professionals. Our aim is to promote the well-being of doping users by adding to the professionals' understanding of doping substances and their use. We do not collect any identifying information, including IP addresses. You can leave any part of the questionnaire blanc. Answering is voluntary.

Gender

1. Man
2. Woman

Which of these products have you used? Check all the products you have ever used for doping purposes.

Stimulants

1. Ephedrine
2. Clenbuterol

3. Other (which one?)

Stimulants: How long are the cycles you use, and what is the maximum dose?

Diuretics

1. Furosemide
2. Other (which one?)

Diuretics: What is the maximum dose you take?

Peptide hormones

1. Growth hormone
2. IGF
3. Insulin
4. Other (which one?)

Peptide hormones: How long are the cycles you use, and what is the maximum dose (please list each product separately)?

Gene doping

1. DNA plasmid
2. Other (which one?)

Gene doping: How long are the cycles you use, and what is the maximum dose?

SARMS: Which products have you used, and at what dose?

Anabolic steroids

Testosterone products

1. Sustanon (or other testo mix)

2. Testosterone cypionate
3. Testosterone enanthate
4. Testosterone propionate
5. Testosterone suspension
6. Testo base
7. Testo caps (e.g. Panteston)
8. Testo gel
9. Other (which one?)

Testosterone products: How long are the cycles you use, and what is the maximum dose (please list each product separately)?

Synthetic liquid steroids

1. Deca (nandrolone decanoate)
2. Trenbolone enanthate
3. Trenbolone acetate
4. Primobolan (metenolone enanthate)
5. Boldenone (boldenone undecylenate)
6. Masteron (drostanolone propionate)
7. Winstrol (stanozolol)
8. Anapolon (oxymetholone)
9. Other (which one?)

Synthetic liquid steroids: How long are the cycles you use, and what is the maximum dose (please list each product separately)?

Synthetic oral steroids

1. Dianabol (methandienone)
2. Oxymetholone
3. Turinabol (chlorodehydromethyltestosterone)
4. Stanozolol
5. Anavar (oxandrolone)
6. Halotestin (fluoxymesterone)
7. Other (which one?)

Synthetic oral steroids: How long are the cycles you use, and what is the maximum dose (please list each product separately)?

Estrogen blockers

1. hCG
2. Clomid (clomiphene)
3. Tamofen, Nolvadex (tamoxifen)
4. Letrozole
5. Anastrozole
6. Other (which one?)

Estrogen blockers: At which phase of the steroid cycle do you use them, how long are the cycles, and at what dose?

What other doping products or methods have you used? (Blood boosting, opiates for doping purposes, etc.)

How long are your steroid cycles (all products included, how many weeks)?

How long are the breaks you take between cycles? Do you use some products between cycles?

Do you change the products you use during one cycle? (e.g. methandienone 3 weeks, then oxymetholone 3 weeks)

How many products do you use during one cycle? (Also list products other than steroids.)

Do you increase the doses during the cycle?

Do you taper the cycle down gradually, or stop all at once?

Do you use anabolic steroids between the cycles (as a bridge), or otherwise continuously? Which products?

Where do you get information about doping products and about how to use them?

1. From a medical practitioner
2. From a coach or a trainer
3. From other users
4. From the internet
5. From books
6. Other

Free word.