



## Is the Naming of Herpes Simplex Gladiatorum Correct?

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### Authors' contributions

*This work was carried out in collaboration between all authors. All authors read and approved the final manuscript.*

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### ABSTRACT

Herpes Gladiatorum (HG) outbreaks should be regarded as serious long term infections that can have negative consequences on the health of individual athletes and the athletic community as a whole.

**Purpose:** The main goal of this analysis was to provide a scientific basis and evidence that the herpes infections in athletes caused by Herpes Simplex Virus type I (HSV-1), might not be appropriately called Herpes Gladiatorum (HG), but should be renamed as Herpes Luctatorum (HL).

**Methods:** The methodology of the current study was included the use of systematic review of the writings in the ancient Greek and the modern literature.

**Results:** From literature review and careful consideration of sports scenes, we found that the sport in which there was extensive physical contact in antiquity is wrestling, and this is not a "mono-

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machia" (single combat). Therefore, the herpes simplex dermatological infections could occur at a priority, as well as in quantity in wrestler athletes (Latin: Luctators), and not in Monomachus (Latin: Gladiators).

**Conclusion:** The most appropriate terminology for skin infections caused by HSV-1 in athletes would thus be Herpes Luctatorum and not Herpes Gladiatorum, as has been widely adopted by the medical community.

*Keywords:* Herpes simplex; gladiatorum; luctatorum; wrestling.

## 1. INTRODUCTION

Sporting activity is directly related with human existence, the primitive man tried to survive through wrestling and running. During wrestling matches there is increased physical contact, skin to skin. This phenomenon leads to transmission of skin diseases/infections among athletes. In general, these data support the fact that most cutaneous infections are caused by close skin to skin contact [1]. Herpes Simplex Virus type I (HSV-1) has been identified as a result of cutaneous or ocular infection among athletes involved in contact sports; in this context Herpes Simplex (HS) infection, is well-known as Herpes Gladiatorum when identified in wrestlers, and as such, it has been extensively reviewed [2,3,4].

## 2. METHODOLOGY

The methodology of the current study was connected with the use of systematic review of the writings in the Greek and the world literature. The writings of important authors-doctors such as Hippocrates, Philostratus, B.J. Anderson, and D. Turbeville, were studied and analysed.

## 3. RESULTS

The word herpes (from the Greek, "to creep") has been used in medicine since antiquity. In his texts, Hippocrates mentions the term "skin lesions" of herpetic type [5]. Cold sores (herpes febrilis) were described by the Roman physician Herodotus in the year 100 of the Common Era [6]. The disease was successfully transferred to rabbits in the early 20th century, and HSV was grown in vitro in 1925 [7,8].

According to the data obtained, the term "herpes" first appears in texts of Greek literature. It has a Greek origin and refers to HSV-caused skin lesions with a creeping, spreading nature. We hypothesize that wrestling provide ample opportunities for the transmission of HSV. Therefore, we analysed the major parameters associated with wrestling and the possible

transmission of skin infections, such as holds, clothes, and sports rules with regard to the possible transmission ways of HSV-1 [9].

### 3.1 Holds

Holds of wrestling, both in antiquity and nowadays, result in direct physical contact, skin to skin, and in this way, to the possible transmission of HSV-1. Wrestling scenes with virus transmission risk holds were identified as "bear hug" <<'αγκαλίζεσθαι>> hold, where hands are placed around the torso of opponent, over the waist [10]. As is clearly visible from figure 1, the athlete on the right applies the "bear hug" grip to his opponent. Athletes in this hold hug tightly to each other, completely naked, so torso and limbs of their bodies come into direct skin contact, a condition, that increases of the risk of eventual transmission of diseases of dermatological nature.

Another wrestling hold suspicious for transmission of HSV-1, is the hold named "Chokehold", "τραχηλίζειν"- "άγγχειν", where an athlete locks the opponent's neck with his arms and forearms. The hold of "Chokehold" is illustrated in figure 2. Direct skin contact plus possible lesions, caused by the intensity of the hold in coherence with the hypothesis that Herpes Gladiatorum is transmitted primarily by direct skin-to-skin contact [11] lead to the conclusion that wrestling is a sport with high transmission risk of HSV-1.

### 3.2 Sport Rules- Transmission Ways of HSV-1

Wrestling is conducted through intense physical contact and seeks victory through use of the body and its levers. According to the rules, during wrestling blows are not allowed, as are holds on the genitals, biting (δάκνειν) and taking out of the eyes (ορύττειν) [12]. All other holds are freely allowed so that athletes come in direct physical contact in many instances and for a reasonable amount of time. The main body parts

that come in direct contact during wrestling, are the neck, head, torso and hands [13].

On the face, skin lesions have been found to occur after face-to-face contact in wrestling, and the failure for isolation of HSV from wrestling mats this suggests person-to-person transmission by direct contact [14,15,16]. Open wounds and abrasions, frequently found in wrestlers, can further enhance the risk of HSV transmission [17]. Infection can occur when the waxy external skin barrier (stratum corneum) is disrupted, otherwise the Herpes virus cannot invade into the deeper epidermal skin layer. In addition moisture brought on by sweating can facilitate virus transfer through the epidermis.

Wrestling implies extensive body contact, and the degree of skin-to-skin contact is the primary means of viral transmission in Herpes Gladiatorum (HG). Also the increased time of the "lock-up" position has enforced skin-to-skin contact, particularly on the face and neck. Because most athletes are right handed, opponents typically lock-up with the right side of their face in opposition. As expected, a review of several HG outbreaks reveals more than 70% of lesions occurring on the head, neck, and face, with a predilection for the right side [18,19,20].

Additionally, wrestling is performed in the same way during training and in official games, which contributes to increased direct skin contact even in work-outs, so that the geometric position increases of virus transmission risk among athletes [21]. Indeed, in another study, this hypothesis was confirmed, with skin infections representing the most commonly reported time-loss condition, accounting for more than 17% of reported events [22].

### 3.3 Clothing

Figures 1 and 2 show that in ancient times, athletes were completely naked during wrestling. The absence of clothing, which leaves more skin exposed, is also one of the contributing factors to the occurrence of HG. That wrestlers fought in complete nudity is confirmed by Philostratus in his book "Images": <<Palestra ... wrestling naked>> [23]. (Translation: Nikitas Nomikos). Limbs and torsos of athletes come into direct and frequent contact (figures 1-2), which leads to the virus transmission risk. Even today, the clothing of athletes in this sport only covers basic parts of the human torso and limbs, but the neck and under-arms are completely uncovered which

facilitates transmission of the virus. In contrast to wrestlers, gladiators were dressed during the contest (Fig. 3). From Fig. 3 it can also be seen that the gladiators wear helmet, skirt, gloves, and greaves. Besides, they keep a sword and shield between them and their opponent(s), which results in the near absence of physical contact, and makes HSV transmission during these fights relatively unlikely.

Concluding, our investigations of the wrestling game show that various sports grips were recognised, such as the waist and neck hold. During the wrestling, athletes had increased and frequent physical contact, which leads to the research hypothesis that this sport provides excellent conditions for the transmission of communicable diseases like HSV-1.



**Fig. 1. Panathenaic amphora no 20044. Found on the island of Eretria. Created on Archons Kallimides era (360-359 BC). The athlete on the right applies a bear hug to his opponent. The naked bodies of athletes are in direct skin contact. This figure derives from the photo archive of author (N. Nomikos). National Archaeological Museum of Athens**



**Fig. 2. Red psykter. The athlete on the left managed to apply the grip of Chokehold “τραχηλισμού” on his opponent’s neck and in particular the hold that it is named “Arm triangle choke”, while the other player has lost his balance. Beholding this figure we see that the shoulder joint of the left athlete with his hands have trap the neck of the opponent and come in direct contact with it. During this wrestling phase transmission of herpes virus is possible. Around 500 BC (the picture is derived from the book "The Olympic Games in Ancient Greece" edited by the General Inspector of Antiquities Gialouris Nikolaos, Athens 1982, p. 206). Torino, Museo di Antichita. Photo Chomon-Perino**



**Fig. 3. Gladiators in Stone; the Colosseum, Rome By trays | Published: 2009 | Location: Rome, Italy. Gladiators are not naked, some of them visible to wear helmet, skirt, gloves, greaves, and keep sword, shield. The figure is derived from the Ed Traves Photo Archives at Temple University (Edtraves.com)**

## 4. DISCUSSION

The gladiators in ancient Rome were armed combatants, who used mainly a sword to keep their opponents at a distance, in Latin "gladius", which gives the gladiators ("swordsmen") their name [24]. In addition, they usually wore personal protective equipment, such as helmets and aprons. So, the gladiators did not have the type of physical contact like the grips-holds wrestlers nor was there prolonged skin-to-skin contact that could result in the possible transmission of HSV. Therefore, the terminology of HSV-1 infection in athletes should be referred to as "Herpes Luctactorum" (based upon the Latin term for wrestlers), or possibly "Herpes Paleorum" (using the Greek word for wrestling, as Greek wrestling predates Roman wrestling), but not "Herpes Gladiatorum", because as discussed before, HSV-1 is primarily transmitted through skin-to-skin contact, e.g. through close body contact as seen in wrestlers and not in gladiators.

## 5. CONCLUSION

The current paper may not obtain a change of the terminology for the HSV-I in athletes, which has been named "Herpes Gladiatorum" for a long period by the scientific community. However, through careful analysis of the most likely route of HSV transmission in martial arts, we show that it is much more likely that the virus is transmitted through wrestling than through sword fights, suggesting the condition associated with HSV infection during sports should be renamed accordingly. We suggest that the term "herpes of wrestlers" is more appropriate for this ailment, thus "Herpes Luctactorum" or possibly "Herpes Paleorum", and not "Herpes Gladiatorum" as adopted by the first scientists of sports and medicine.

## CONSENT

Not applicable.

## ETHICAL APPROVAL

Not applicable.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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