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BASIC AND PRACTICAL ASPECTS OF VETERINARY ACUPUNCTURE FOR PHYSIOLOGICAL CORRECTION IN ANIMALS

(review)

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Abstract

An urgent task of modern biological science is the development of efficient, reliable and safe methods of body physiological correction in changing environment. This problem covers almost all living things, including humans and farm animals, which in turn affect environment and the humans through animal products. This is the most characteristic of modern industrial animal husbandry being complicated by the increase in the operating loads on the animals. The survey shows grounded and biologically possible use of veterinary acupuncture method to normalize body functions. The advantage of acupuncture is due to therapeutic and economic efficiency, versatility, safety, and wide range of application (G.V. Kazeev, 2000). This method is based on the concept of body integrity in normal state and pathology. The material basis and specific elements of acupuncture are proved (N.I. Verzhbitskaya, 1981; G.V. Kazeev 2000; J.C. Darras et al., 1993; D.J. Mayer, 2000; A.R. Liboff, 2004; R.H. Bosma et al., 2006.). It is found that when animals are subjected to acupoints' treatment, different changes occur, e.g. in biochemical parameters such as concentration of opioid peptides and monoamines in blood (J.S. Han, 2004; C.H. Zhao et al., 2005), levels of hormones (T. Aso et al., 1976; P.V. Malven et al., 1984; D.F. Bossut et al., 1986), catecholamines and growth factors (H. Chang et al., 1983; P.J. Battista et al., 1986), in cellular immunity activation (T. Kuan et al., 1986; AP Sánchez, M.D. Ángel, 2012). Clinical parameters are stabilized due to the acupuncture analgesic and sedative effects (J.G. Lin, W.L. Chen, 2008; J. Lin, Y. Chen, 2012). An uniqueness of acupuncture lies in its regulatory action (G.V. Kazeev, 2000; K.T. Freudenberg, 2010). Acupuncture is finding increasing application in veterinary practice in musculoskeletal diseases (W.W. Chan et al., 1996; G. Habacher et al., 2006), gastroenterological (Y.C. Hwang, E.M. Jenkins, 1988; K. Watanabe et al., 1998; K.T. Freudenberg, 2010) and reproductive disorders (J.H. Lin et al., 2001; W.A. Schofield, 2008), and also it is used for sedation and analgesia (A.M. Klidge, B.B. Martin, 1989; J. Still et al., 1998). Acupuncture increases tissue sensitivity to medications and blends well with medicines (G.V. Kazeev, 2000; D. Souza et al., 2007; J.H. Lin J.H. et al., 2001). The therapeutic effect is increased when medications and biologically active substances are introduced into the acupoints (S. Altman, 2003; S. Ben-Yakir, 2006; T.E. Taradaynik et al., 2011), moreover, their doses can be reduced significantly (G.V. Kazeev et al., 2001; P.L. Stelio et al., 2008; T.E. Taradaynik et al., 2012). Finally, the use of acupuncture in the animal husbandry makes it possible to get eco-friendly and safe livestock products.

Keywords: acupuncture, biologically active points, domestic animals, reproduction.

Pharmaceuticals, including antibiotics and hormones, used to correct physiological state of animals, including their reproductive function, do not always lead to the desired results. In addition, a number of drugs have contraindications and restrictions, especially in cases where animal products are used by people. In this regard, the use of acupuncture (AP) seems relevant as this is a drug-free, environmentally friendly and cost-effective method. In AP technique a disease is regarded as a pathological process, inevitably affecting the entire body as an indivisible whole, associated with the environment, in which a dysfunction in one organ will naturally destroy processes in other organs and systems [1-3].

The main elements of the AP in the classical eastern (primarily Chinese) medicine are acupuncture points (APP), channels and circulating energy called, according to the tradition, the life energy. The energy of the internal organs is in constant circulation forming a system. Specialized APP are arranged on channels, through which, according to certain traditionally established rules, one can affect in different ways the body in order to restore the energy balance between the organs [3, 4]. In other words, the acupuncture is a method of regulation of living functions, which works through a dynamic balance between energy intake and expenditure [3].

AP efficacy was observed earlier under violation of thyroid function [5], thyroid-pituitary-ovarian function [6], the pituitary-adrenal axis [7], and AP influence on hypothalamic nucleus was shown [6, 8].

Being originated from China, the method was adapted to the specific conditions of a particular region and has become unique to each country. According to the World Health Organization (WHO), this branch of traditional Chinese medicine is now widely used throughout the world and is one of those kinds of medical practice, in which a considerable progress has been made. According to the reports submitted by 129 countries, 80 % of them now recognize the benefits of acupuncture, and in 30 % of countries which are the WHO members, there are training programs on so-called alternative, or complementary, medicine (including acupuncture) with graduates at sufficiently high professional level, including bachelor's, master's and doctorate [9].

Despite the apparent effectiveness, the theoretical foundations of classical oriental medicine for a long time remained rejected by western experts. Therefore, for AP a theory has been proposed based on morphological, physico-chemical and functional characteristics of the biologically active points of the body [10].

The studies have shown that the elements of the classical AP are quite tangible; AP points (APP) have a specific structure and are activated by appropriate stimuli, including magnetic and electromagnetic fields, having definite effect [3, 10, 11]. In experiments on animals G.V. Kazeev has shown the failure of the reflex mechanism of AP action in contrast to validity of ideas about energy and information system of the body [2, 4], in a certain sense approximated to the modern concepts of energy and signaling in biology.

Under pathology the APP is converted into the zone, and disorders in the organs and systems change biophysical, biochemical, histological parameters in the acupuncture zones [2, 12]. Living cells emit weak electromagnetic wave and photons generating endogenous field of the body, which affects the transmission of intracellular and intercellular signals and, therefore, the physiological functions [13-16]. Experiments with radioactive isotopes proved the presence of channels extending from the APP [17].

The clinical effect of AP is due to changes in biochemical processes and the synthesis of bioactive substances at local, organ-specific and system-specific levels in response to the APP activation. This leads to the normalization of the functioning cells, tissues, organs, systems and organism as a whole. Thus, the AP increases the concentrations of opioid peptides and monoamines in the blood [18-22], has a direct effect on gonadal paracrine and autocrine control of steroidogenesis through stimulation of production and release of adrenaline, catecholamines and growth factors [23, 24]. The role of nitric oxide, which mediates a response of the cardiovascular system to PPA activation, and involvement of hypothalamic nuclei in this process are established [25]. Efficiency of AP as immuno-stimulating, anti-depressant and analgesic factor is proved [26, 27]. More strong immunity response due to AP was reported in experimentally infected animals [28]. Interestingly, in this not only the number

of natural killer cells, but their activity increases [29]. There is experimental evidence of changes occurring at the cellular level when APP activated [30].

Acupuncture improves memory and learning ability in laboratory rats [31]. The authors explain the therapeutic effects by an increased B, Ca, Cu, Fe, K, Mg, Na, and P levels in animal brain tissues due to APP activation. A notable reduction of blood pressure was observed in animals due to significant decrease in the plasma renin activity after PA session [32]. An increase in liver and spleen blood flow was recorded when APP was subjected to current with a frequency of 2 Hz [33].

AP increases the tissue response to chemical substances, including medicines [34]. The method becomes popular in veterinary medicine under diseases of the musculoskeletal system, gastrointestinal tract, the reproductive system, due to sedative and an analgesic effect it is widely used under spinal injuries, intoxications, intervertebral hernia and dysplasia [35, 36]. The results obtained on dogs prove the favor of AP and its combination with pharmacological agents in the pathology of the nervous system, spine, feet and as an anesthetic [37-40]. The effect comparable to the influence of medication, was achieved in the normalization of the gastrointestinal tract in horses [1, 41]. There is evidence of the analgesic effect of electroacupuncture on sheep [19]. Bone regeneration in rats after prolonged APP activation was reported [42]. Efficiency of the method is described for the treatment of pigs [43, 44] and calf [45] with diarrhea. AP sessions (5 days, for 20 minutes daily) normalized liver function in dogs with hepatitis [46]. Positive results were obtained with rumen acidosis [47], left abomasum displacement, and normalization of the proventriculus function [48] in dairy cattle.

Currently, reproduction becomes one of the most pressing problems of biology. A special place takes the problem of high embryonic mortality due to a number of factors [49, 50]. For the modern world agriculture a marked decline in reproductive function at highly productive cattle is the most important (50, 51).

In medical practice, there are enough examples of AP successfully used in reproduction, particularly in extracorporal fertilization (IVF) to reduce fetal mortality [52-56]. Here are the following effects: increased uterine blood flow, improves metabolism and nutrition of the embryo and fetus [57, 58], reduction of uterine activity [59], the weakening of the total stress and mother's anxiety in the absence of negative effects of the procedure [60, 61]. There is evidence on the effectiveness of the procedures under infertility, induced by polycystosis, stress and immunological disorders [62, 63], and for induction of ovulation [64].

AP influences positively on implantation in animals, suggesting that acupuncture affects the activity of endometrium receptors promoting the secretion of leukemia inhibitory factor (LIF) and interleukins, necessary for successful implantation [65]. AP facilitates normalization of cortisol and prolactin levels, which, in turn, affects the quality of oocytes and embryo implantation [54]. Differences were shown in the activity of certain APPs under various pathologies of organs and systems [66-68]. Certain APPs are important to produce combined or opposite effect [30, 69]. For example, in dogs the electroencephalograms with certain APPs show a pronounced calming effect, which is amplified by the combined use of the AP and sedation [70].

Activation of APPs associated with reproductive sphere considerably changes the concentration of luteinizing hormone (LH), follicle-stimulating hormone (FSH), estradiol and progesterone in blood plasma [18, 19, 71-73] and enhances the pituitary response to gonadotropin-releasing hormone (GnRH) [71]. Activation of lumbar APP suppressed cyclooxygenase-2 in the endometrium and myometrium [59].

It is found that the effect arises only when the APPs are activated while a similar action on the adjacent areas of the body does not lead to significant changes [2, 17, 74-76]. Moreover, electropuncture of APPs remote from the stimulated organ led to more tangible results compared to the points located next to it. It is confirmed, for example, that the APPs remote from the intestine stimulate peristalsis, while the next-located ones slow it down [77]. Data on stimulation and inhibition, contradictory at first glance, can be explained by the initial state of the organ so that high function will be decreased, while low function will be increased. This is the unique regulatory effect of AP [2, 4, 48]. For example, acupuncture of the point located between the nostrils results in 90-100 % revival in animals under apnea for 10-30 s, and in 40-50 % revival under cardiac arrest, when the procedure is performed within 5-10 minutes after stopping [78], whereas delicate prolonged activation of this point results in lasting calming effect [79].

AP-treatment in animals showed sufficient effectiveness at anestrus and multiple unsuccessful insemination in pigs and cows, for controlling the brooding instinct in hens, and also is a method complementary to conventional therapy [2, 36, 80-83]. When affecting AP points located in the thoracic, lumbar and caudal spine, the positive effect is reported of restoring potency in boars, and cervical dilation and coordination of uterine contractions during parturition [84]. The effectiveness of the method was mentioned at anestrus and infertility in mares, and at cryptorchidism and low potency of stallions [85].

It is known that in animal husbandry for normalization of reproduction, in particular for synchronizing the sexual cycle, a variety of hormones and their analogs are widely used throughout. However, the results do not always meet expectations, especially because of the poor management, high environmental temperatures and, most importantly, reproductive dysfunction. In such circumstances, the AP makes a tangible beneficial effect. For example, the combination of AP with the injection of 50 % glucose bilaterally between the transverse-rib processes of the 5th and 6th lumbar vertebrae significantly increased the proportion of pregnant cows (84, 86). A higher effect was observed by combining the AP with an injection of human chorionic gonadotropin, or prostaglandin with follicular or luteal cysts and persistent yellow bodies in cows, respectively [84]. The positive results were obtained under placenta retention, uterine atony, induction of labor and preventing abortions in cows, analgesia and stop bleeding, overcoming agalactia syndrome in sows, reducing the interval before the estrus after giving birth; In addition, there was an increase in weight gain in young animals [87].

APPs are the best place for administration of medicines. Moreover, their effective dose can be considerably reduced, at that possible side effects are absent [2, 88, 89]. The positive therapeutic effect was noted when administering vitamins, homeopathic medicines and electrolytes in APPs [90, 91].

We proposed a method of APPs activation in cows and heifers by means of microdoses of the medium conditioned by embryos in vitro. The injection of 0.2 ml of the medium in the APP of sacral spine makes it possible to increase the effectiveness of artificial insemination by 22 % and reduce mortality in transplanted embryos by 18 % [92-94].

About 150 APPs are known in veterinary practice, with one to 20 used per session [2, 95, 96]. In Russia a unique topographical atlas has been recently developed by G.V. Kazeev and AV Kazeeva for acupuncture points of home animals and formulation of APP application at various diseases. This makes possible the practical use of AP method by veterinary specialists, including industrial animal husbandry [2].

In addition to traditional acupuncture, there are electropuncture, laserpuncture, acupressure, cryopuncture; besides, ultrasound and other factors can be used for APP activation. Any of them are effective [2, 97].

Thus, the modern view on the ancient method of the eastern-based medicine, the acupuncture, and studying its mechanisms at physiological, biochemical and other levels allows to develop science-based approaches to the optimization of therapeutic techniques and to increase the effectiveness of preventive measures in the veterinary practice, using acupuncture along with recognized techniques of veterinary medicine.

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