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Research Article

Physiologic and Subjective Health Benefits of Milmed among Racehorses in Training

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Abstract

Two studies were performed to assess the efficacy of the treated yeast, Milmed, for the alleviation of physiologic health problems, mainly 'common-cold' and inflammation symptoms, performance improvements among racehorses in training. In Study I (n=8), Time to reduce pulse to 130 and Pulse rate after 15-mins was estimated both before and after the Milmed treatment whereas in Study II (n=15), levels of improvement on a scale of 1-to-10, as well as on judgements of vigour, general health and performance following several weeks of Milmed administration were assessed. It was found that racehorses presenting poor health showed improved physiologic health responses, Time to reduce pulse to 130 and Pulse rate after 15-mins, following Milmed treatment over several weeks (Study I); furthermore, before-to-after Milmed treatment correlations were significant and positive for both the time taken to reduce pulse to 130 and pulse rate after 15 min. In Study II, Milmed treated racehorses showed improvements in both subjective health assessment and performance. The present findings underline the utility of several weeks of Milmed yeast treatment for the alleviation of mainly respiratory conditions among racehorses under the relatively stressful training and racing season. The probiotic, Milmed, ought to be considered a useful nutraceutical agent for treatment of large mammals.

Keywords: Racehorses; Respiratory health issues; Milmed treatment; Weeks; Physiologic; Subjective; Improvement.

Introduction

Racehorses, whether trained for "gallop" or "trotting", offer a valid and useful model for the investigation of changes in immunological health parameters induced by training programs since they are subjected constantly to intensive exercise schedules in combination with homogeneous background conditions [1]. The effects of training are related to the particular form of exercise, its intensity and duration as well as physical circumstance, such as ground condition, all pertain to influence health parameters; they may include also deficits within immunologic and haemato-biochemical characteristics [2]. Thoroughbred racehorses offer the equine equivalent of athletes that shaped by not only physiological and anatomical prerequisites to training but also their heritage of running over wide-open spaces that predispose to an exercise lifestyle [3,4]. The highly selective genetic selection processes that racehorses, have been subjected to have provided animals that, in order to excel in the racing world must be coerced to adhere to the physical-somatic, morphological, at organ and cell levels, biobehavioural, daily health and pharmaco-metabolic requirements to optimise the training efforts and maximal performance over a long racing-season [5,6]; not least, the immunologic estimations, whether subjective or otherwise, ought to be assessed [7].

Although it remains unclear as to whether respiratory conditions and respiratory viruses contribute asthma/allergy observed among racehorses, it is implicated as a common cause of poor health and performance [8,9]. Furthermore, it has been observed that lower respiratory tract infection/inflammation occurs often among populations of racehorses-in-training without breathing signs or exercise intolerance [10]. Exercise by itself was observed to promote IL-8 gene expression in peripheral blood levels; the IL-8 is a chemoattractant cytokine produced by a variety of tissue and blood vessels that cells attract and activate neutrophils within inflammatory regions. They found too that the gene expression of this cytokine was not elevated in bronchoalveolar lavage fluid nor was it enhanced in the blood levels of resting horses that presented nonclinical lower respiratory inflammation, which negated the diagnostic usefulness of the procedure for clinical situations. The putative promotion of neurtrophils implies exercise necessity. Since equine rhinitis infection has been shown to be associated with poor performance in racehorse [11] together with links to respiratory integrity, estimations of 'common-cold' and/or other infections of this type are relevant. In this regard, diverse experimental findings imply that agents in the alimentary canal immune system, such as probiotic and prebiotic entities, as well as symbiotics or other pertinent tissue exert comparable influences upon the intrinsic immune system through upgrading the processes through which the abolition of pathogens is promoted [12].

Although the use of probiotics appears not to have been attempted in racehorses, there remains ample evidence for their efficacy over a wide range of health conditions [13-15]. Probiotic yeast cells, prepared as suspensions, may be utilised as transporters of Extremely High Frequency (EHF) electromagnetic fields to induce and promote a range of neurobiologic and neuroimmunologic properties within different host organisms. The “transference-agents”, which are the yeast cells subjected to millimeter wavelength EHF induce, as yet unidentified agents that have been associated with neuroprotective and neurorestorative effects in a mouse model of parkinsonism [16-18] in addition to an anti-allergy effect [19]. The exposure of Saccharomyces cerevisiae or Saccharomyces carlsbergsis to electromagnetic millimeter wavelength in the EHF range of 30–300 GHz produces a “treated” yeast extract, assigned the generic term Milmed (cf. Milmed Unico AB or Milmed MilliOne AB), is according to the original methodology that was developed through the research studies of Golant [20-22] that focused upon the provenance and restitution of cells and tissues. Nevertheless, the status of the EHF methodology, a complementary and/or alternative medicine, remains unproven to some degree albiet with a level of safety, and further experimentation is currently underway, despite the lack of World Health Organisation (WHO) recommendations. Taken together, there is an emerging consensus in therapeutic analyses that immunologic integrity of the host cells, partaking of probiotic agents may be safeguarded through the regulation, stimulation, and modulation of the immune responses [23].

Millimeter wave (MW) therapy has been proven effective for the treatment of a wide range of inflammatory ailments, including gastrointestinal diseases [4], diabetes [13], wound healing [20], and homeostasis restoration [21,12,5], as well as healing infections in laboratory animal studies [24]. Taken together, the above and a wide range of other clinical and laboratory studies have underlined the therapeutic propensities of MW applications over a plethora of inflammatory conditions [25]. However, the direct application of MW, though efficacious, may both potentially and materially prove damaging to the tissues exposed. The potential transference of EHF millimeter wave exposure via treated yeast cells to living host individuals, whether rodents, equine, cattle or human, through yeast suspensions has offered evidence of therapeutic benefit [14,12]. Thus, yeast cells, the “transference-agents”, following MW treatment induced anti-neurodegenerative, anti-allergic and anti-inflammatory effects [16,26,27]. Furthermore, the absence of toxicity, assessed in vitro and in vivo, in combination with in vivo and in vitro anti-inflammatory actions, activates the necessity for physiologic and health assessment [28]. The major purpose of the present studies was to ascertain whether there were putative effects of the treated yeast, Milmed, upon physiologic and subjective estimations of poor health and performance among racehorses in training.

Methods and Materials

Study I

Animals: fullblood “trotters” in training participated, aged between 3 and 12 years, in Sweden (Age:mean=6.25 ± 3.11 years; weight: 350–450 kg, height:165–168 cm). Housing, feed, temperature, etc, were all maintained according to the standards established for Swedish racehorses (trotters) in training. All of the the animals participating, though originating from different stables, were recipient of routine vaccinations to ensure their resistance to influenza and tetanus attacks using veterinary-recommended marketed vaccines and showed negative results in the equine infectious anaemia virus antibody tests. Over the 1-year period before the actual training was initiated, each horse was maintained in a similar manner with regard to several parameter including, being housed in individual stables, the normal darknes-light photoperiod, alimentary canal constancy, and normal indoor temperatures. When the training period was initiated, each of the animals was allowed to acclimatize to the new conditions of exercise and examination. Each horse received feed on three occasions each day that consisted of about 2 kg of hay that was supplemented with fresh-cut grass, about 2 kg of a concentrate of mixed cereal ingredients, including hay pellets, corn, oats [limited amounts], barley, and beans, sometimes lucerne, fruit and vegetables were added according to availability; access to fresh water was ad libitum. The training period extended over Monday and Saturday during the same time-of-day for each of the horses that participated in the study whereas calculations of the ambient temperature-humidity index.

Study II

Animals: Fourteen fullblood "trotters" in training participated, aged between 3 and 12 years, in Sweden (Age:mean=6.10 ± 2.34 years; weight: 350–450 kg, height:165–168 cm). Housing, feed, temperature, etc, were all maintained according to the standards established for Swedish racehorses (trotters) in training All of the the animals participating, though originating from different stables, were recipient of routine vaccinations to ensure their resistance to influenza and tetanus attacks using veterinary-recommended marketed vaccines and showed negative results in the equine infectious anaemia virus antibody tests. Over the 1-year period before the actual training was initiated, each horse was maintained in a similar manner with regard to several parameter including, being housed in individual stables, the normal darknes-light photoperiod, alimentary canal constancy, and normal indoor temperatures. When the training period was initiated, each of the animals was allowed to acclimatize to the new conditions of exercise and examination. Each horse received feed on three occasions each day that consisted of about 2 kg of hay that was supplemented with fresh-cut grass, about 2 kg of a concentrate of mixed cereal ingredients, including hay pellets, corn, oats [limited amounts], barley, and beans, sometimes lucerne, fruit and vegetables were added according to availability; access to fresh water was ad libitum. The training period extended over Monday and Saturday during the same time-of-day for each of the horses that participated in the study whereas calculations of the ambient temperature-humidity index.

Treated yeast cells (Milmed)

A liquid composition as described in the patent application was evaluated in a study performed during the time period of March 2015 to September 2020. The composition contained Saccharomyces cerevisiae (DSM 33148) at an amount of 30×106 CFUs/ml suspended in sterilized wort as described in the patent application. The yeast cells (Saccharomyces cerevisiae (DSM 33148)) had been treated as in the patent application. "Normal dose" refers to 200 ml of the composition per week. In order to comply with the racehorse trainers' and owners' dictates it was not possible to arrange any control groups. Thus, each group treated with Milmed was used as its own control on the "before-and-after" principle.

Preparation and Administration of Milmed

Milmed preparation through the exposure of the yeast fungi, Saccharomyces cerevisiae, a strain that was obtained originally from the International Research Center "Beer and Beverage XXI Century", Moscow, Russia, was performed as described previously [16]. Accordingly, the yeast stock was cultured in wort which was extracted by passage through the meaded malt extract. Electromagnetic, millimeter wavelength field exposure of the yeast to the super high frequencies with electromagnetic waves in the EHF range of 30–300 GHz was then performed to induce the treated yeast extract termed Milmed [20]; following these procedures the next step was the re-culturing of the yeast at 25–28°C range over 48 h. After this, the cell concentration in the ultimately-exposed yeast suspension was assessed through application of NucleoCounter YC 100 (ChemoMetec A/S, Denmark), while the extent to which the suspension should be diluted was ascertained. The resulting yeast suspension was delivered to each of the racehorse stable centres wherein each bottle was placed in large refrigerators on a weekly basis and each batch maintained at 50°C throughout its usage. Each dose was equivalent to 1000 mg/horse of the dried preparation, consisting of a cell concentration of more-or-less 2 x 106 per Kg of horse-weight, approximately, yeast cells daily according to the preparation protocol and design developed from previous observations [17] regarding stability and viability of compound (each dose contained 1 x 106 yeast cells per kilogram of horse weight). Measured amounts of the Milmed suspension were administered per orally, twice weekly, from the Production Unit located at Milmed AB Company (Farjestad, Sweden). Each bottle consisting of sterilised wort for dilution was sent concomitantly to each racing stable.

Statistics

Time to reduce pulse to 130 and Pulse after 15-min were subjected to a priori t-tests and Pearson correlational analyses (Study I).

Results

Absence of adverse effects of Milmed

In addition to the estimations incorporated in both Studies I and II, particular attention was paid to any emergence of negative effects of the treated yeast but such effects were observed even in those cases wherein the health improvements were considered negligible. Furthermore, although in excess of 100 racehorses, in Sweden, have recipient of the Milmed treatment for poor health, no adverse reactions have ever been reported.

Study I

Milmed treatment, from 4-to-8 weeks, induced improvements in physiologic status involving both 'time to reduce pulse to 130' and ‘pulse after 15-mins’, as shown by the before-and-after comparisons.

Table I presents the results of Study I.

Test	No. weeks	Time to reduce pulse to 130	t-test a priori
Before	4 to 8	75.8 ± 25.6 secs	t=3.41, df=7, p<0.01
After		54.5* ± 12.3 secs	
		Pulse after 15-mins	
Retest			
Before		68.5 ± 6.9 secs	t=5.21, df=7, p<0.001
After		61.0* ± 4.4 secs	
		Pearson Correlations: before-after	
		Time to reduce pulse to 130	r=0.786, p<0.02
		Pulse rate after 15-mins	r=0.836, p<0.01

Table 1: Physiologic responses of racehorses before and after Milmed treatment over 4 to 8 weeks.
*significantly different to Before test value, t-tests.

There were significant reductions of post-training exertion pulse following several weeks of Milmed treatment compared with before this treatment, as well as a lower pulse after 15-min post-exertion (t-testing, see above). Correlational analysis indicated positive and significant correlations from before Milmed treatment to after treatment.

Study II

Treatment of racehorses presenting lower airway or cold-like symptoms was alleviated by several weeks of treatment with the millimeter wave-treated yeast, Milmed. No adverse effects of the treatment were observed. Table 2 presents the results of Study II. Additionally, both performance and general health estimations indicated improvements: 10 horses of 15 in the former and 11 out of 15 in the latter.

Treatment of racehorses presenting lower airway or cold-like symptoms was alleviated by several weeks of treatment with the millimeter wave-treated yeast, Milmed. No adverse effects of the treatment were observed. Table 2 presents the results of Study II. Additionally, both performance and general health estimations indicated improvements: 10 horses of 15 in the former and 11 out of 15 in the latter.

	Age (years)	Diagn	Infect	Weeks of Milmed	Status-Improvement	Perform	GH
Before	6.10 ± 2.34	9 out of 15	10 out of 15	3 to 12	1.00 ± 0	10 out of 15	11 out of 15
After					5.86 ± 3.10*		
					T=5.84,		
					df=13		

Table 2: Subjective health and performance estimations before and after Milmed treatment over 3 to 10 weeks.

*Significantly different to Before test value, paired t-test, orthogonal, $p<0.001$. Diagn=diagnosis; Infect=infection-airway; Perform=performance; GH=general health.

There were significant improvements following Milmed treatment, as assessed by the 'improvement-scale', and by estimations of performance and general health (Chi-square). These results would appear to confirm those of Study 1.

Discussion

Milmed treatment maintained over four to eight weeks improved significantly the physiologic and subjective health of racehorses in training. It is probable that these observations offer the primary evidence for suitability of a probiotic for the amelioration of health problems among racehorses. The present findings may be summarized as follows:

a. Racehorses presenting poor health showed improved physiologic health responses, Time to reduce pulse to 130 and Pulse rate after 15-mins, following Milmed treatment over several weeks (Study I),
b. Before-to-after correlations were significant and positive for both the time taken to reduce pulse to 130 and pulse rate after 15 min
c. A second batch of racehorses in training presenting poor health showed significant improvement on a scale of 1-to-10, as well as on judgements of vigour, general health and performance (Study II).

Taken together, the findings of Study I and Study II imply that Milmed treatment was efficacious in improving the poor health symptoms of selected racehorses in training. Whether recipient of veterinary diagnosis or not, all inclusively, the racehorses participating in this Milmed study displayed signs of respiratory tract infection/asthma/inflammation that it was considered to contribute to their health deficits to a greater or lesser degree.

It seems evident that respiratory tract and the lower airways of racehorses are vulnerable to inflammatory processes that are expressed in the poor health and performance of these animals during training [9,10]. The incidence of equine respiratory-airway disorder remains a common source of poor performance and training interruptions with inflammation that is detected in the tracheal and bronchial regions [29-31]. Recent evidence from in vitro studies carried out with microglial BV2 cells, U-937 monocytic cell line, SK-N-SH, SH-SY-5Y, IMR-32 neuroblastoma cell lines that determined cell viability through the evaluation of Trypan Blue exclusion indicated a remarkable absence of toxicity due to exposure to both Milmed treated yeast and untreated yeast [28]. Rather, in the presence of Milmed there was found to be exhibited a trophic activity upon neuroblastoma cells, as confirmed by the induction of nerve growth factor (NGF) and brain-derived neurotrophic factor (BDNF) mRNAs. Furthermore, within BV2 migrolial cells, Milmed antagonized the pro-inflammatory actions of polysaccharide (LPS). Nutraceuticals, also termed functional foods, have been defined as any substance that is ingested as a food or part of a diet and promotes medical or health benefits, including the prevention and treatment of disease conditions [24,32]. In this context, nutraceutical supplementations, whether probiotic like Milmed or not, may alter too the commensal gut microbiota and facilitate prevention or resilience against chronic non-communicable/communicable degenerative and/or inflammatory conditions [25].

Conclusions

Both studies I and II supported the contention that the treated yeast, Milmed, ameliorated the health deficits of racehorses in training, especially with longer periods of treatment with the nutraceutical probiotic, as estimated by physiologic responses, performance and general health assessment.

Limitations

Due to each trainer's insistence that every horse treated should receive the nutraceutical, Milmed, and not a placebo control, it was not possible to include a control group so that each animal had to act as its own control.Due to each trainer's insistence that every horse treated should receive the nutraceutical, Milmed, and not a placebo control, it was not possible to include a control group so that each animal had to act as its own control.

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