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Detox Foot Pad: A Fact or a Fantasy

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Abstract

There is no a research based reliable documented evidence that Detox Foot Pads work efficiency to remove heavy metal from the body. Many manufacturers of Detox Foot Pads' claim that their Foot Pad products draw many toxins out from human body during you sleep process. The main aim of the current research was to prove the evidence of detoxifying power of this Foot Pad, to remove metals "lead (Pb), cadmium (Cd), mercury (Hg) arsenic (As), selenium (Se), silver (Ag), thallium (Ti) and antimony (Sb)" from the body is it really true or not?. The study groups of this research were 53 cases from both sexes and with different ages from 18 to 64 years, who applied Detox Foot Pad overnight and removed at the morning. From the current research there, no significant difference between pre and post measurement in investigated heavy metals content "(Pb), (Cd), (Hg) (As), (Se), (Ag) and (Sb)" of the detox Pad before and after overnight application. Except for Antimony (Sb), that showed a statically significant increase in post-foot pad session than pre-foot pad session ($P < 0.024$). While, there were statistically significant decreases in the concentrations of both lead and cadmium metals in the post-foot pad session when compared with non-used-foot pad ($P < 0.021$ and 0.001 respectively). This study proof that Detox Foot Pads were not really detoxify the body and remove any metal from it via dermal route, during overnight Detox Foot Pad application procedure.

Keywords: Detox Pad; Metals toxicity; Detox procedure; Foot pad; Alternative medicine

Introduction

The many of producers and distributors for the Detox Foot Pad claim that; it is a natural way to assist human bodies in the removal of heavy metals burden load inside their bodies, beside also metabolic wastes, toxins, microscopic parasites,

mucous, chemicals, cellulite and much more. They alleged that by the body foot Pad detoxification process, they regain a healthy body condition and promoting naturally a strong immune system and healthy lymphatic functions. The producer reported in their documents that, the Detox Foot Pad provides a group of powerful detoxifying tourmaline "negative ion producing" ingredients that provide an effective combined external cleansing agent [1].

On the opposite site, the exposure of humans to the normal quantities of heavy metals that found in naturally occurring resources is completely out of control in current highly civilized industrial country. Previously, the medical community just defines the sources of heavy metal exposure as a single source via industrial dramatic exposure route. Recently, most of potentially toxic heavy metal sources may be from variable contaminated sources throughout surrounding environment. As for example, lead poisoning in children may develop from sucking or eating lead-based painted toys, and so legislation has been enacted to reduce this possible lead contamination [2].

Lead, mercury, cadmium, arsenic, and aluminum are the most common reported toxic minerals exposures. Most of these heavier metals are quite stable and eliminate from the body very slowly. So, heavy metals become toxic when they are not eliminated by the body and accumulate in both soft and hard tissues [3].

One treatment strategy line to dealing with the prevalence of heavy metals in the body is to extract the heavy metal out of the body through external procedures like Detox Foot Pad. The producers and manufactures of various forms of Detox Foot Pad documented that an independent laboratories analysis have shown the efficacy of Detox Foot Pad in accelerating the process of elimination of heavy metals via the skin, and binding them in the Pad to prevent re-absorption. This scientifically proven confirms show a selective accumulation of the toxins inside the applied detox pads by showing the higher concentration of heavy metals, before and after Detox Foot Pad applications [4,5].

Detoxification foot pads are adhesive foot pads that manufacturers claim can markedly improve health when placed under the feet during sleep. Some of these pads may contain multiple ingredients that allegedly pull toxins from the body via skin of the feet, but critics have shown that the process is scientifically unviable [5].

In this proof-of-principle research, we evaluated the Detox Foot Pads from four different distributors. This research was to establish the efficiency of Foot Pad to remove different heavy metals from the body via skin is really present or not.

Subjects and Methods

Study design

This was a proof-of-principle, nonrandomized research. Ethics approval was given by Research Ethics Board of the Dammam Poison Control Center DPCC according to the ethical standards set forth in the 1975 Helsinki Declaration. All studied cases enrolled gave written informed consent to participate in the research [6].

Participants

Healthy participants were recruited through direct contact to DPCC staff, their relatives and general public. The interview summarized the requirements for the research and asked interested sharing personnel to respond to the study coordinator.

Inclusion criteria required participants at/over 18 years of age, in good health, and with a stable medication/supplementation regimen for at least six weeks before to and during participation in the research. Individuals were excluded from the study, if they were pregnant or nursing mothers; had a pacemaker; were organ transplant or metal joint implant recipients; received antiarrhythmic, anticoagulant or chelating medication; or received any medication whose absence could mentally or physically incapacitate them (antipsychotics, antiepileptics, etc.).

Detox Foot Pad

Four variable available marketed Detox Foot Pads were used for all sessions in this study. The main ingredient of Detox Foot Pad were; Bamboo sap, which contain nitric acid as a chief ingredient and have strong acid-fast and antimicrobial function; Tourmaline which, forms anion and improves peripheral blood circulation by the effect of infra-red ray. **Zeolite**; It is a patented form of processed zeolite proven to effectively detoxify metals in humans and reduce the speed of cellular oxidation. **Sporopollenin**; It is derived from the outer wall of spores and grains, binds like a sponge to toxic metals, toxins, and pesticides. **Organic Vinegars**; It supports circulation and produces an osmotic effect that promotes the transport of toxins across cell membranes. **Organic Bamboo Vinegar**; It helps discharge undesired waste matter from the body. **Agaricus**; It is a mushroom delivered products which contains high quantity of vitamins, minerals, amino acids, and glucan.

Eucalyptus oil; it is a vegetable oil which accelerates the effect to cure human bodies. Mugwort extract; It is an oriental herbal medicine, which makes human body warm and moist. Chitosan; it is extracted from red sea king crab, with a highly effective moistening dermal effect. Highly purified silica; that is composed of fine particles with multiple pours of high-adsorbed capacity. Polyolic alcohol; that is used as moisture-keeping agent. Starch which act as a water-soluble ingredient and moisture absorbent agent which finally creates a synergism to improve the efficacy of all Detox Foot Pad ingredients [7].

Principles of foot detox pad applications

i-Site of application: It is apply it to the soles of the feet. According to Chinese medical knowledge, surface of human body has more than 360 acupuncture points, with over 60 acupuncture points represented on the soles of the foot. They considered as a reflective zones of major internal organs inside human being [8].

ii-Mechanism of detox: When the blood circulates to the soles, the fixed Foot Pad can absorb heavy metals toxins that released from the acupuncture points. The Foot Pad comes in a white colour sachet that is applied to the mid part of the soles of the feet. After lapsing only one night of body detox, there may be significant physical changes to the smell and color of the detox Pad (from brown, grayish black to black) as it reflects the amount and degree of the amount of absorbed toxins, from the body.

iii-Duration of detox: With continuous application of detox Pad, there should be a visible remarkable reduction in the colour and odor of the sachet.

Instructions for self-applications foot detox pad

Every studied cases involved in this research had a direct contact interview to learn how to apply the Detox Foot Pad overnight and how to remove it in the second morning day as the following instructions:

1st Instruction: Be alert to remove the larger piece from the adhesive sheet and discard. Place the side of the Foot Pad that has the close intimate to adhesive plaster.

2nd Instruction: Place the Foot Pad onto the mid part of the sole, and stick and spread firmly onto the sole of the foot with wearing socks over the Foot Pads to avoid kicking them off during the night application.

3rd Instruction: Apply the foot Pad for 8 hours for toxins to be fully extracted from the body, and if the studied case sleep less than 8 hours, keep the foot Pad intact with the sole of the foot until lapse eight hours.

4th instruction: Be alert for the following sequelae; the detox pads may produce warm sensation after application, and during the night application the pads usually becomes dark in color with bad smell, sticky touch, as they absorb toxins and

waste matter from the body, all of previous mentioned physical changes usually appear.

5th instruction: Avoid applying the Foot Pad over open wounds, mucous membranes, or around the eye area.

Settings

All foot detox overnight sessions were conducted at homes of the studied cases (**Figure 1**).

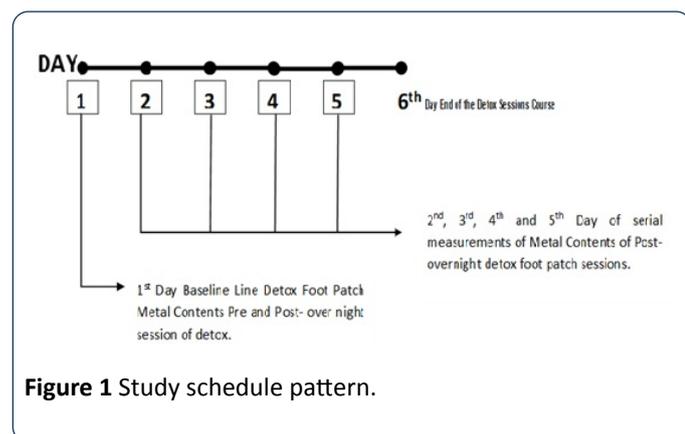


Figure 1 Study schedule pattern.

Post-overnight Detox Foot Pad sessions

At the end of each day of 5 days overnight foot Pad detox sessions, participants were requested to provide a used Foot Pad in the overnight-detox session for heavy metals analysis after following instructions provided by the laboratory for obtaining these Detox Foot Pads in the given specific cardboard envelop that allows the respiration of the collected specimens.

Heavy metal laboratory detection

The overnight used Detox Foot Pad heavy metals analyses were performed using Inductively Coupled Plasma Source Mass Spectroscopy (ICP-MS). The specimens were stored at 4°C until transport to the Environmental Analytical Toxicology department at Dammam Poison Control Center, where the levels of the whole overnight used Detox Foot Pad; As, Se, Ag, Cd, Sb, Hg, Ti and Pb were measured by ICP-MS. Precisely, 10 g of overnight used Detox Foot Pad specimen was transferred to a Teflon digestion tube (120 ml) and mixed up with 7 ml of the acid mixture Nitric/Hydrofluoric/Hydrochloric acids (HNO/HF/HCl, 4.5: 2: 0.5) [9].

The tube was sealed and the specimen was digested inside a microwave oven (Milestone ETHOS 1600). After digestion, the tubes left to cool down to room temperature, Then, the tube of wet digestion was opened and the inside of the lid was rinsed with distilled and de-ionized water (DDW) and the mixture heated on a hot plate (120°C) for 30 minutes to drive of the residual HF and HCl. The resulting digest was filtered in a polypropylene flask using 1% HNO and made up to 50 ml volume with DDW. For ICP-MS measurement the clear digest obtained were diluted 10 times using DDW [10].

Specimens and standard reference materials (SRM) were prepared in a batch of eight, including a blank (HNO/HF/HCl) digest [11]. The eight different metals (As, Se, Ag, Cd, Sb, Hg, Ti and Pb) in all the prepared solutions were quantified subsequently by ICP-MS.

Statistical analysis

Statistical analysis was applied using SPSS (statistical package for social science) program version 22 (SPSS Inc., Chicago, Illinois, USA) on an IBM compatible computer. The Detox Foot Pad heavy metal concentration reports provided by Dammam Poison Control Center, list the concentrations of 8 individual elements. Descriptive statistics (mean and standard deviation) were calculated for each metal. In addition, to facilitate reporting, metal tested were categorized into two groups. The change in each metal's level was calculated by subtracting the concentration in the Post-Foot Pad session (Post-FPS) from the concentration in the "original" Pre Foot Pad specimen (Pre-FPS) to deliver the difference foot Pad-sessions (Diff-FPS).

There were two distinct groups of Foot Pad specimens: (1) Foot-Pad with no feet detox session "pre-session" Pre-FPS, (2) Foot-Pad with feet detox session "post-session" Post-FPS. The t-test compared the Post-FPS to the Pre-FPS metal concentration to detect whether the Diff-FPS metal concentration was statistically significant.

Results

The results of the current study were mentioned and enumerated in the next mentioned two tables. **Table 1** describes number, age and gender of participants that were included in the current study. All Participants received no compensation for involvement in the study but were provided with copies of the detox metal levels results from their laboratory tests. The concentration of investigated metals elements showed very low quantities in both pre and post foot Pad detox session (**Table 2**). The results reported a non-statistical significant difference between pre and post foot Pad detox sessions for the next mentioned metals; mercury (Hg) arsenic (As), selenium (Se), silver (Ag), antimony (Sb)" and Thallium (Ti). Only one metal showed a statistically significant increase in post-foot Pad session than pre-foot Pad session, which it was Antimony (Sb) ($P < 0.024$).

Table 1 Demographic characters of the participants.

Gender	Number (%)	Range of age	Mean of age
Male	44 (83%)	18-64	36.9
Female	9 (17%)	18-40	25.7
Total	53 (100%)	18-64	34.9

On the opposite side, there were statistically significant decreases in the concentrations of both lead and cadmium metals in the post-foot Pad session when compared with non-used Foot Pad ($P < 0.021$ and 0.001 respectively).

Schedule modifications: Some participants' schedules necessitated some minor re-adjustments of scheduled setting of the five consecutive days, all but five participants of the 5th detox foot sessions occurred on the 6th day instead of 5th day. One participant's 3rd Detox Foot Pad setting was performed three days after the usually scheduled 2nd session due to an illness unrelated to the study. All participants were instructed

to maintain a stable lifestyle and medication/supplementation regime throughout the five days study; however, one participant, during 3rd day, required taking azithromycin antibiotic course for 3 days for a chest illness unrelated to the study. All detox foot overnight settings were well tolerated by all of the participants. There were no side effects or adverse events reported during the overall course of the study.

Table 2 Changes in Metal levels before and after Detox Foot Pad session.

Elements ($\mu\text{g/gm}$)	Detox Foot Pad (DFP) (n=16)	Post-Detox Foot Pad session (PDFPS) (n=53)	Post-DFPS-DFP	P value
	Min-Max Mean \pm Std dev	Min-Max Mean \pm Std dev	Difference \pm Std dev	
Arsenic (As)	0.00-0.03 0.015 \pm 0.013	0.03-1.19 0.136 \pm 0.158	0.121 \pm 0.079	0.136
Selenium (Se)	0.04 – 0.06 0.053 \pm 0.011	0.03-1.20 0.145 \pm 0.159	0.092 \pm 0.081	0.254
Silver (Ag)	0.04-0.06 0.048 \pm 0.011	0.00-0.11 0.035 \pm 0.029	-0.012 \pm 0.015	0.408
Cadmium (Cd)	0.05-0.08 0.068 \pm 0.016	0.00-0.08 0.025 \pm 0.024	-0.041 \pm 0.013	0.001*
Antimony (Sb)	0.02-0.03 0.068 \pm 0.005	0.01-6.67 2.503 \pm 2.12	2.481 \pm 1.069	0.024*
Mercury (Hg)	0.00-0.00 0.00 \pm 0.00	0.00-1.20 0.098 \pm 0.176	0.097 \pm 0.089	0.275
Thallium (Tl)	0.01-0.02 0.0175 \pm 0.005	0.00 – 0.05 0.025 \pm 0.016	0.007 \pm 0.008	0.369
Lead (Pb)	1.50-2.50 1.935 \pm 0.438	0.00 – 4.7 0.975 \pm 0.798	-0.961 \pm 0.406	0.021*

*Bold indicates a statistically significant difference, P<0.05 (Independent t test).

Discussion

We found that the Detox Foot Pad did not induce the elimination of studied metals through the feet of study participants during overnight Foot Pad Session. There is no evidence that the Pad stimulates pathways of dermal metals elimination through the skin, after application of overnight Detox Foot Pad sessions for 8 hours for five consecutive days.

Efficiency of the detox foot-pad: The manufacturers of the Detox Foot-Pad claim that their Pads effectiveness lies in its ability to withdraw the metal from the body by process of osmosis. This solution deals with the high prevalence of heavy metals in the body by drawing them and toxins out of the body through skin, and binding them in the Pad to prevent re-absorption. The reason of the application of the detoxifying pads mainly on the feet are multiple reasons that mainly related according to ancient Oriental knowledge that documented, the human body obtains over 60 acupuncture points situated on the soles of the foot [12].

The sole of the foot is known as the second heart of the body, It is the reflective zone of our major internal organs, it is

also potential home for most of the toxins. When the blood circulates to the soles via both systemic and lymphatic circulations, the Detox Foot Pad can absorb toxins released from these acupuncture points. As, the blood and lymphatic circulatory fluids reach their most distant point in the soles of the feet before being return pumped back up into the higher portions of the body [12]. All of the previous mentioned benefits of Foot Detox Pad in detoxifying power of heavy metals were not appeared in the current research and may be discover harmful effects as release of lead and cadmium contents inside the Detox Foot Pad to the body. Despite it is a very low amount less than one ($\mu\text{g/gm}$) but may be harmful on the long run or in other situations.

On the same side of our revealing results; the idea that toxins can be sucked out of human body through the soles of feet is completely absurd, as Stephen Barrett [13] investigated the detox, foot patches efficiency. He pointed out that skin is not a permeable membrane, so substances will not easily flow out of the body through the skin. And even if materials could pass through the skin this way, that's not how detoxification works. True detox involves the liver and kidneys working together to filter the blood. The skin just doesn't work that

way; all it can do is emit sweat, which contains water and salt (and a little sebum) [14].

The manufacturers of Detox Foot Pads emphasize the fact that when the Detox Pads are placed on the feet, they are clean and white, and when they are removed after the end of the detox session, they are black. They imply that this is proof that the pads have extracted toxins from the body through skin, whereas, according to group of investigated studies, the darkening is caused by a chemical that becomes darker when it reacts with moisture that release from pronged dermal contact [15-17].

Points of the strengths and limitations: In this study, we investigated the application of the detox footpad amongst 53 individuals. Each participant was exposed to five detox foot pad overnight sessions over five consecutive days. It is thinkable that a larger number of detox overnight footpad sessions with interrupted pattern of rest are required to observe clearly an overall detoxification effect in the studied cases; however, the lack of observable changes in detox metals concentrations in Detox Foot Pad that might be attributed to a person seems unlikely. If there was any appearance of the resistance to the effect of Detox Foot Pad from a single session this was accounted for with multiple consecutive sessions exposures over the course of five days.

The outcome of primary importance in the current study, toxic metal concentrations, depends on accurate measurements with low interest variability. Strength of the current study was the quality analysis performed by an independent laboratory following good laboratory practices with expertise in Detox Foot Pad metal analysis. The DPCC laboratory was blinded to the source of the Detox Foot Pad being tested and to the protocol from which sequential participant days of Detox Foot Pad were taken.

Conclusion

In this proof-of-principle in the current study we discovered no evidence to suggest that Detox Foot Pad help promote the elimination of toxic metals from the body through the feet. On the opposite side, likely to cause harm or result in any increased uptake of metals, the use of Detox Foot Pad may release minute quantities of metals into the body during overnight Detox Foot Pad sessions.

Recommendations

This was a proof-of-principle study with a relative small-investigated sample size. The relative small sample size would not allow us to identify minor shifts in the elimination of metals through the applications of the Detox Foot Pad sessions. It is possible that a larger investigated participants study may be able to identify laboratory significant changes. Further, we investigated apparent healthy participants, and it is thinkable that, in cases with high levels of metals toxicity, application of the Detox Foot Pad could have led to increased metals elimination through Detox Pad Sessions, which may need broad-spectrum investigated studies.

Conflict of Interest

The authors declare that they have no competing interests.

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