

Safety and detoxification effect of honey massage

Abstract

Background: Medical massage has positive health effects during treatments or rehabilitation. Massage with honey said to be useful also for detoxification, for which the evidence is limited.

Aim/Purpose: To study the safety and detoxification effect of honey massage. Does honey massage remove trace elements (e.g. manganese) from the body, which is recommended for daily intake: is honey massage safe? Can honey massage remove harmful elements or compounds from the body?

Participants

Experiment 1: Two groups are built: One group from Manganese mine worker (3 persons), and none-mine worker (4 persons). All seven-person was evaluated separately.

Experiment 2: We built three groups. The first group was consuming bio certified meat and vegetables, the second the bio vegetarian and the third group regular, each group 3 persons.

Research design: The subjects were massaged with honey. During the massage, the texture of the honey changes and absorbs certain substances from the skin (we name it M-honey for Massage-Honey). The composition of the original and M-honey was examined.

Main outcome measures: In the first series, we examined M-honey's for twenty-seven elements, including heavy metals. In the second series, each group's M-honey was analysed for content of 502 complex chemicals.

Results: Concerning minerals, including manganese, the amount of effluent was so small that the honey massage did not endanger the homeostasis of the body. It was found that the M-honey was able to remove a small amount of Al, Ba, Ni, Sr. One group contained the neurotoxic permethrin.

Conclusion: Honey massage has been shown to be safe and to have a detoxifying effect. However, other massage techniques have not been compared to honey massage, so we do not know whether the detoxifying effect is a specific feature of honey massage or is a common feature of several massage techniques.

Keywords: honey massage, detoxification, permethrin, Hungarian acacia honey, manganese, heavy metals, Bio certification

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Abbreviations: M-honey, Honey after massage; RDI, Recommended daily intake

Introduction

It is widely known that different massage technique has different, positive health effects in treatment and rehabilitation. For example, it has a significant impact on pain reduction.¹ Medical massage has added value also in the neurological rehabilitation program. The positive findings included a decrease in pain medication and oedema, improved range of motion, muscle and mental relaxation.² Swedish massage can significantly reduce occupational stress in the operational staff of emergency medical staff.³ In recent times, honey massage has become widespread. Service providers talk about detoxification effect of honey massage.⁴ Using honey massage, we looked for evidence that a toxin was eliminated from the human body.

Materials and methods

General information for both experiments

For the massage, we used Hungarian acacia honey (*Robinia pseudoacacia L*) from beekeeper Peter Bross (Budapest, Hungary).

During acacia nectar flow, the bees do not visit any other flowers, so acacia honey is one of the cleanest monofloral honey; it remains for a long time fluid. Because this nature of this honey, the beekeepers do not heat it. Honey does not undergo changes caused by heat, it remains in its natural state.

We asked all patients to wash the skin just actively mechanically without soap and without dush gel to minimise the traces of foreign influencing molecules. Patients were placed on a massage bed. The patient's back was wiped with warm water cloth just before massage.

The masseur's hands were thoroughly washed where they were rinsed to a foam-free condition after the soap wash.

A spoonful of honey (about 15g) was dripped onto the subjects' back, which was distributed. The fingers and palms of the masseur contact the entire surface of the masked skin and then wake up. Massage is convenient if we make wavy movements, with the palm below the wrist first touching the skin, then the palm and finally the fingers. By the time the fingers reach the surface of the skin, the wrist part of the palm has already moved away. The hands did not move sideways; they only approached the skin and then drove away.⁴ With the time the massage is going on, the scattered honey gradually

became more and more sticky. During the massage, the highly sticky honey lifts the skin to a few centimetres by moving the underlying tissues resulting in very active tissue movement. The lifting is similar to the degree of skin lifting used in cupping. Other massages have also been known to have mechanical effects on the tissues by lifting the skin and the underlying tissue. The massage was continued for 30 minutes. During the thirty minutes of massage, the texture of the honey changed; it became a whitish, greyish texture. There are two reasons for the changes in the honey; on the one hand, a physical change, the honey gets creamy. At the same time, different materials were included in the honey from the patient's skin (M-honey).

Patients in the first experiment

The first series of massage was carried out in Úrkút, Hungary the control group in Nagykovácsi, Hungary in 2013. In Úrkút is an active manganese mine. The test persons are working in the mine since 2, 24 and 31 years long; the control group was four persons, one woman and three men. Two men had deviation to the other, one had light obesity (BMI = 29.8), significantly more fatty tissue on the massage place, and another had much more sweats on the skin during the massage. We examined the content of M-honey for heavy metals and other elements with two different methods: ICP-MS and ICP-OES. P, S, Si, Ti was measured only with ICP-OE. The measured elements were: Sb, As, Ag, Cd, Co, Mo, Pb, Sn, V, Al, Ba, Zn, P, Ca, K, S, Cr, Mg, Mn, Na, Ni, Cu, Sr, Se, Si, Ti, Fe.

Patients in the second experiment

The second series of massage was carried out in Nagykovácsi, Hungary in 2014. We built three groups: Bio certified all eater (meat and vegetables in the diet, three persons), Bio certified vegetarian (3 persons), conventional (3 persons). The ages were between 35-55, with no significant differences among the groups.

In this second series of tests, we investigated 502 artificial chemicals that were once approved for plant protection and bee treatment in the E.U., for example, DDT, fipronil, chlorpyrifos, tau-fluvalinate, pencicuron, pendimethalin, penconazole, pentachlor anizole, permethrin (total cis and trans isomers), picolinafen, picoxystrobin. The standard EN 15662:2009 was used for measurement, with measurement methods GC-MS and LC-MS-MS with detection level from 0.005 to 0.05 mostly 0.01mg/kg. The detection method for permethrin was LC-MS-MS with a detection minimum of 0.01mg/kg.

All participants provided informed consent before their inclusion in the study. The massages were performed by the author, educated for medical massages at National Institute of Rheumatology and

Physiotherapy, Budapest, Hungary. WESLING Hungary performed all laboratory analysis, a certified honey laboratory in Budapest, Hungary immediately after the massage was conducted in the year 2013 and 2014. Evaluation of results was finished in 2020.

Results

The acacia honey before treatments did not contain in the detectable amount of Sb, As, Ag, Cd, Co, Mo, Pb, Sn, V, Al, Ba, Cr, Mn, Na, Ni, Cu, Sr, Se, Ti, Fe or chemical residues of the tested 502 chemicals. The two methods ICP-MS and ICP-OES approved each other, the results of the data shown that there are no significant differences in the results of the two different measurement ways (data not shown). We did not find in the original honey or the M-honey above the limit of measurement for nine elements. The elements and the sensitivity of this measurement (Table 1). Two heavy metals of our main interest were Cadmium and Lead was not detectable neither in the basis honey nor in the M-honey. The first set of the experiment showed that with the honey massage, some elements had been transferred to the M-honey (Table 2). The Table 2 also shows that the titanium removed in the lady group showed extremely high value (19.0 mg/kg) while for the men it was in the range from not detectable to 2,2mg/kg. The reason for the difference may have been the use of a female titanium-based medical device (anti baby). Given the properties of titanium and the fact that titanium is accepted unreservedly as a material for general medical implants, the removal of titanium cannot be considered as a detoxifying effect. Titanium has no oral chronic reference value (Table 3).

Table 1 Detection sensitivity for elements, which are tested and not detected in the honey before and after the massages in mg/kg. The second column gives the detection level of the measurement

| | |
|-----------------|-------|
| Antimony (Sb) | <0,5 |
| Arsenic (As) | <0,5 |
| Silver (Ag) | <0,3 |
| Cadmium (Cd) | <0,03 |
| Cobalt (Co) | <0,05 |
| Molybdenum (Mo) | <0,3 |
| Lead (Pb) | <0,5 |
| Tin (Sn) | <0,5 |
| Vanadium (V) | <0,3 |

Table 2 Detected elements before (basis honey) and after massage for the different test persons and massage technics

| Element | Basis honey | Man fatty ⁴⁹ | Man ⁴⁸ | Man sweating ⁴⁸ | Lady ³⁸ | Manganese mine workers since | | |
|----------------|-------------|-------------------------|-------------------|----------------------------|--------------------|------------------------------|----------|----------|
| | | | | | | 2 years | 24 years | 31 years |
| Aluminum (Al) | <1 | 39 | 23 | 9 | 30 | 20 | 15 | 17 |
| Barium (Ba) | <0,3 | 0.5 | 0.3 | <0,3 | 0.4 | 0.3 | 0.4 | 0.3 |
| Zinc (Zn) | 0.5 | 2.8 | 1.8 | 0.9 | 3.2 | 2.1 | 2.4 | 1.7 |
| Phosphorus (P) | 37 | 39 | 42 | 87 | 88 | 41 | 43 | 43 |
| Calcium (Ca) | 24 | 140 | 81 | 60 | 148 | 155 | 104 | 136 |
| Potassium (K) | 233 | 428 | 414 | 753 | 796 | 382 | 562 | 609 |
| Sulfur (S) | 14 | 67 | 146 | 46 | 67 | 103 | 116 | 142 |
| Chromium (Cr) | <0,3 | 0.3 | <0,3 | <0,3 | <0,3 | <0,3 | <0,3 | <0,3 |

Table Continued...

| Element | Basis honey | Man fatty ⁴⁹ | Man ⁴⁸ | Man sweating ⁴⁸ | Lady ³⁸ | Manganese mine workers since | | |
|----------------|-------------|-------------------------|-------------------|----------------------------|--------------------|------------------------------|----------|----------|
| | | | | | | 2 years | 24 years | 31 years |
| Magnesium (Mg) | 10 | 28 | 23 | 37 | 50 | 32 | 22 | 30 |
| Manganese (Mn) | <0,3 | 0.6 | 0.3 | 12 | 12 | 2.3 | 3.8 | 8.4 |
| Sodium (Na) | <10 | 50 | 70 | <10 | 20 | 330 | 210 | 370 |
| Nickel (Ni) | <0,3 | 0.3 | <0,3 | <0,3 | 0.5 | <0,3 | <0,3 | <0,3 |
| Copper (Cu) | <0,3 | 0.6 | 0.5 | <0,3 | 0.7 | 0.8 | <0,3 | 0.4 |
| Strontium (Sr) | <0,1 | 0.3 | 0.2 | <0,1 | 0.3 | 0.2 | 0.1 | 0.2 |
| Selenium (Se) | <1 | <1 | <1 | <1 | 1 | <1 | <1 | <1 |
| Silicon (Si) | 2 | 75 | 49 | 6 | 45 | 41 | 34 | 41 |
| Titan (Ti) | <0,1 | 1.3 | 0.9 | <0,1 | 19 | 5 | 1.7 | 2.2 |
| Iron (Fe) | < 1.0 | 30.0 | 18.0 | 8.0 | 15.0 | 16.0 | 15.0 | 17.0 |

Table 3 Maximal removed amount of the element compared to Oral Chronic Reference dose (for detoxification effect) and RDI (for safety check) in absolute and percentual values

| Element | Maximal value relative mg/kg | Maximal value of removed element in absolute mg/massage | Oral Chronic Reference Dose RfDo (mg/day) for 80 kg bodyweight | RDI for 51-60 years old man mg/day | Efficiency of detoxification % | Safety max % |
|----------------|------------------------------|---------------------------------------------------------|----------------------------------------------------------------|----------------------------------------------|--------------------------------|--------------|
| Aluminum (Al) | 39.0 | 0.585 | 80 ¹³ | | 0.7 | - |
| Barium (Ba) | 0.5 | 0.0075 | 16 ¹³ | | 0.05 | - |
| Zinc (Zn) | 3.2 | 0.048 | 24 ¹³ | 10 ¹¹ | 0.2 | 0.5 |
| Phosphorus (P) | 88.0 | 1.32 | N/A ¹³ | 700, ¹¹ 1000 ¹² | - | 0.13 |
| Calcium (Ca) | 155.0 | 2.325 | N/A ¹³ | 1000 ^{11,12} | - | 0.23 |
| Potassium (K) | 796.0 | 11.94 | N/A ¹³ | 2000 ¹¹ | - | 0.6 |
| Sulfur (S) | 146.0 | 2.19 | N/A ¹³ | | - | - |
| Chromium (Cr) | 0.3 | 0.0045 | N/A ¹³ | 0.030-0.1, ¹¹ 0.035 ¹² | - | 12,8 |
| Magnesium (Mg) | 50.0 | 0.75 | N/A ¹³ | 350, ^{11,12} | - | 0.18 |
| Manganese (Mn) | 12.0 | 0.18 | 11.2 ¹³ | 2.0-5.0, ¹¹ 5.5 ¹² | 1.6 | 3.3 |
| Sodium (Na) | 370.0 | 5.55 | N/A ¹³ | 2000 ¹² | - | 0.28 |
| Nickel (Ni) | 0.5 | 0.0075 | 1.6 ¹³ | | 0.46 | - |
| Copper (Cu) | 0.8 | 0.012 | 3.2 ¹³ | 1.0-1.5, ¹¹ 1.7 ¹² | 0.38 | 7.1 |
| Strontium (Sr) | 0.3 | 0.0045 | 48 ¹³ | | 0.009 | |
| Selenium (Se) | 1.0 | 0.015 | 0.4 ¹³ | 0.07, ¹¹ 0.06 ¹² | 3.75 | 25.0 |
| Silicon (Si) | 75.0 | 1.125 | N/A ¹³ | | - | - |
| Titanium (Ti) | 19.0 | 0.285 | N/A ¹³ | | - | - |
| Iron (Fe) | 30.0 | 0.45 | 56 ¹³ | 10, ¹¹ 6 ¹² | 0.08 | 7.5 |

The only person where selenium also left the body was the lady where titanium was also very high. It is not excluded that the amount of selenium on the detection threshold is related to the titanium medical device. The maximum amount of manganese removed from a group was 12.0mg/kg for a maximal value of 15g M-honey, would give 0.18milligram, which is 3.3 per cent of the RDI 5.5mg⁵ (Table 3). Honey massage is safe for manganese household; it does not remove manganese of a scale that would cause manganese deficiency. No

significant difference between the mine worker (max value 8.4mg/kg) and the non-mine worker (maximal value 12.0mg/kg) groups can be detected. In the long run, we did not perform measurements to determine how much manganese was otherwise present in the human body for mine workers. However, it could be stated that they were not on medical treatment for an overdose of manganese. In the second phase of the studies, M-honey was tested for 502 molecules that were EU-approved or still in use in agriculture.

For one group, we found a single molecule, 0.068mg/kg permethrin found, all other 501 particles were not detectable (<0.01mg /kg or <0.03mg /kg respectively). The permethrin was found only in one group with the BIO-vegetarian certified diet.

Discussion

There are multiple quality systems, like bio, öko, natural, Demeter. Acacia honey without any special certification was pure and clean from toxic heavy metals and chemical residues. This cleanness is the nature of this honey; it is collected in vast, untreated natural forests. The chemical-free honey also means that the beekeeper did not treat the bee families with a technique leaving residues in honey. The distribution of the elements in the M-honey shows a high standard deviation, and because of the small number of test persons, quantitative indicators cannot be formulated.

In table 3 we give in columns the maximal value (among all patients) as relative mg/kg, the maximal absolute value of the removed element in mg, the Oral Chronic Reference Dose RfDo (mg/day) for 80kg bodyweight person for compare detoxification effects, the recommended daily intake as an example for a 51-60years old man, the detoxification efficiency and the safety value. The maximal absolute value of the removed element is the upper limit of the theoretical possible removed element calculated as multiplicand of the relative amount with the honey's original weight (15g). Since the M-honey is less in weight as the original honey, the maximum value is a mathematical upper limit. We calculated the detoxification efficiency as a percentage ratio of the removed element to the oral chronic reference dose. We calculated the safety value as a percentage ratio of the removed element to the RDI value.

We found four elements that have an oral chronic reference dose and no trace element: Sr, Ba, Al, Ni. Up to 0.009, 0.05, 0.7 and 0.46 per cent of these limits are removed by honey massage. Since these concentrations are not considered toxic (Table 3), there is no evidence of a detoxifying effect. Where the weight of the element removed is less than the RDI, we cannot speak about detoxification: Zn, Mn, Cu, Se, Fe. For two elements (Cr, Se) the basis honey and all but one sample did not reach the detection sensitivity. One-one samples showed the minimum detectable levels. Since the difference may be tiny between the samples of the detected and not detected categories, we can not speak about a significant effect. To find a significant difference, we need a more sensitive technique. In the first measurements of the experiment, no detoxifying effect could be detected on elements including on heavy metals.

In the second series of measurements in M-honey, permethrin 0.068 ppm was found. Permethrin is suspected to be neurotoxicant. Permethrin has no tolerance value in the foods in the USA. Total Diet Study In F.Y. 2015, the FDA analysed four market baskets in the TDS program. Each Market Basket consisted of 263-266 different foods. Altogether, 1061 samples were analysed. In 2015 Permethrin was found in 33 food samples, in a concentration of 0.002 – 1.736 ppm.⁵ In 2016, it is found in 44 samples, in a mass of 0.0047 – 1.384 ppm.⁶ In 2014, in the E.U. from 120 honey samples they found in 3 (2.5 %) permethrin residues, while the tolerance level is zero ppm.⁷ The Permethrin as residue remains an essential factor. Our finding of 0.068 ppm is in the middle of the USA experience.

The bio-vegetarian group is vulnerable: speaking to the test subjects, we can only formulate for the cause of the permethrin findings. One hypothesis is that in the evenings, they sit on a terrace

that is exposed to high-fineness anti-mosquito sprays scattered across an enormous aeroplane. Aerial spraying spreads the shower over a range of at least 10 km, which, of course, can reach cultivated areas that are otherwise BIO certified. Members of the eco-friendly BIO certified diet group may go to the forest more often, so tick attacks are frequent. Tick repellents contain legally permethrin. The same group has dogs and cats, which may also result in contact with a flea-control agent. Also, the contamination over the food in our case could not be excluded.⁸⁻¹⁴

Conclusion

Honey massage had removal effect for 18 elements. For 11 minerals (Table 3) with recommended RDI the mean value of removed weight is 5.2 %, while the median value is 0.6 %. Excluding the Selenium mean value drops to 2.96 % and median value to 0.55%. Except for selenium, none of the mineral removal effects did compromise the physiological processes associated with the daily recommended intake, and the honey massage remained safe. One has to carry out further considerations about selenium, even though the 25 per cent there means no risk to health.

We found no relevant detoxification effect for the 26 elements tested. For the artificial chemical substances released ever in the E.U., honey massage was able to remove one toxic molecule from the human body, permethrin. The group, which was affected is a surprise, the bio certified vegetarian eater group. We did not search the source of this molecule, which is forbidden since 2000 in the agriculture of the E.U. Permethrin has extensive use in other areas of life. The source of permethrin could have been aerial mosquito spraying by aeroplane, tourist tick repellent, contact to pet anti-flea products or contamination of bio-certified food. It is a contradiction in the regulations that while a molecule is generally banned in agriculture, in many other areas its use is permitted while still maintaining a link with humans, despite the suspected neurotoxic danger. The subjective opinion of massaged patients is that honey massage is stress relieving, energising, soothing, and the skin becomes much smoother. The phenomenon of the stress-relieving effect experienced by us is in line with the research results of others.^{13,14}

Limitations of the study

It is enough to show a single case for a phenomenon to exist. We proved that the honey massage has a specific detoxifying effect. However, to develop quantitative indicators, i.e. to assess the extent of the detoxification effect, the experiments should be repeated on a more extensive set. It is not clear whether this effect applies only to the honey massage or other techniques, e.g. to the oil massage too. In order to classify the effectiveness of the honey massage, both the contamination of the test subjects and the measurement of the efficiency must be performed on a more significant number of samples.

It would be important to consider more than just a theoretical upper limit for selenium excretion. In order to get an exact value, M-honey should be measured exactly. If the weight of M-honey is only half the weight of the original honey, the actual value will be reduced to half the theoretical maximum (12.5%). On the other hand, the selenium present in the body and in the diet of the test subject should be determined using a precise method. The experiment should be repeated on significant numbers of persons. During the massage, the scent of honey disappeared, it became very odorous, but the components that caused it was not measured.

The toxin content of the test subjects' bodies was not measured before the massage. If the patients' body did not contain, e.g. heavy metal, then the lack of detoxifying effect of the honey massage is not proof of the ineffectiveness of the honey massage. This limitation can be overcome if the study of the phenomenon could be repeated in patients who are known to have a toxin in their body.

Future research

On the one hand, the experiments must be repeated on a more extensive and well-analysed set before the massage. It would also be useful to examine groups of patients who are known to be "cause" or "result" from the accumulation of a "toxin". On the other hand, the analysis of newer molecular groups (e.g. volatile components) should also be included in the research.

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Conflicts of interest

Author declares that there are no conflicts of interest.

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