COMPARISON OF THE EFFECT OF SIMPLE AND SUCCUSED HOMEOPATHIC DILUTIONS ON SYSTOLIC FORCE: A STUDY ON ISOLATED PERFUSED RABBIT’S HEART

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ABSTRACT

The Homeopathic concept of potentization on dilution / succussion of a substance is considered mysterious for their normal and reverse effect on tissue. This concept of potentization is observed in the present study with differences in the effect of simple and succussed dilutions on systolic force. For this purpose, both simple and succussed dilutions of Adrenaline were prepared serially, ranging from $10^{-3}$ to $10^{-36}$ for testing on the isolated perfused Rabbit’s heart. Langendorff heart assembly was used to perfuse the heart and the systolic force was recorded on Oscillograph through isostonic transducer. Results demonstrated significant difference between SD & SUD at $10^{-3}$, $10^{-5}$, $10^{-6}$, $10^{-7}$, $10^{-11}$, $10^{-27}$ & $10^{-36}$. Conclusively, this study confirms that there are differences in the effects of SD & SUD. While, potentization or reverse effect observed than normal has been found in-consistently throughout the range of dilutions used. Thus in-consistency expresses the instability of change in parent drug molecule.

Key words: Potentization, succussion, adrenaline, systolic force, langendorff, isolated heart.

INTRODUCTION

Homeopathy is based on the “law of the infinitesimal dose”, discovered by Dr. Hahnemann, i.e., the more a substance is diluted the higher its potency (Dutta, 1991; Leckridge, 1997; LeRoy, 1998). Experiments with higher and higher dilutions of substances avoid toxic side effects (www.homeosite.7p.com, 2002). Substances could be potentized, i.e., their “immaterial and spiritual powers” released to make active substances more active and inactive substances active (www.ncahf.org, 1994).

The Hahnemann’s method of potency preparation described by Cook (1997), i.e., potentization is carried out successively in two distinct steps dilution and succussion, after the preparation of mother tincture (the homeopathic medicine in its most concentrated form). The process involves the sequential or serial dilution of mother tincture with a mixture of alcohol or water. Each dilution is followed by succussion, which involves vigorous shaking with impact or it is the process in which solution is put into continuous mechanical shaking for a given time period.

Further, succussion is responsible for a change in the original molecule reprints (Hughes, 2003) of the drug used and its new molecular structure is supposed to depend upon the kind of solvent used. Many of the workers have tested various drug dilutions for bioassay, even beyond Avagadro’s number i.e., $6.24\times10^{-24}$ (Krawkow, 1923; Konig, 1927; Boyd, 1968; Stephenson, 1973; Kratz, 2003). The probability of the presence of even one molecule of the original drug beyond Avagadro’s number is zero or close to zero.

In addition, homeopathic procedure of dilution is not only responsible to potentize the drug dilution but also responsible to produce reverse effect that is opposite from the normal effect of the original drug. A number of scientists have reported potentized and reverse (opposite to normal) effects on biological tissues. These are: isolated ears of Rabbits (Krawkow, 1923), metamorphosis of tadpoles (Konig, 1927), guine pig atria (Winegrad and Shanes, 1962), frog heart (Boyd, 1968), isolated Gastrocnemius (Stephenson, 1973), plants growth (Jones and Jenkins, 1981), growth of Yeast (Baker and Smith, 1985), plant growth (Khan et al., 1991), isolated intestine (Azeem et al.,1999), isolated intestine (Arifa et al., 1995, 1997a, 1997b, 2000, 2001) and isolated heart (Erum et al., 2002).

However, potentized effects of SD and SUD were never observed on mammalian vital organs, like heart except Erum et al., (2002) and no suitable explanations on their mechanism of action is available (Aabel et al., 2001) in any of the above mentioned studies.

In the light of the above mentioned facts the present study has been carried out to observe them on Rabbit’s heart. For this purpose, isolated heart was perfused to study the difference in the effect of simple and succussed Adr dilutions ($10^{-3}$ to $10^{-36}$) including the potentized and reverse effects as well.
MATERIALS AND METHODS

i) Experimental protocol:

Rabbits (Oryctolagus cuniculus) of either sex ranging from 1.0-1.5 Kg were used for experiments. These experimental animals were killed by decapitation for isolation of heart, immediately. The isolated heart was mounted and perfused through Langendorff assembly according to Azeem et al., (1999). The perfusate was oxygenated (95% O₂ and 5% CO₂) Kreb’s Henseleit Buffer maintained at 7.4 pH and regulated at 37°C. The perfusion was carried out through the aorta at a constant pressure monitored through mercury manometer. The composition (mM) of oxygenated Kreb’s Henseleit Buffer was NaCl (118); KCl (4.70); CaCl₂ (1.25); MgSO₄ (1.20); NaHCO₃ (25); and Glucose (11); according to Headrick et al., (1996).

ii) Preparation of dilution:

In all the experiments, simple dilutions (SD) and succussed dilutions (SUD) of Adr were prepared by dissolving 0.01gm Adr in 10ml distilled/de-ionized water. This dilution contains 5.5mM of Adr (mother tincture) indicating 10⁻³ dilution or 1x potency from which further dilutions were prepared upto 10⁻³⁶ dilution or 34x potency, this last dilution of 34x potency may contains 5.5 x 10⁻³³ mM Adr, i.e., above Avagadro’s number. For the preparation of SUD the diluted drugs from 1x to 34x (10⁻³ to 10⁻⁵⁶) were shaken for two hours in a mechanical shaker.

iii) Recording of cardiac activity of isolated perfused heart:

The isolated heart was perfused through aorta for coronary perfusion and its ventricular activity was recorded through isotonic transducer on Oscillograph (Harvard apparatus Ltd. UK, Cat no. 50-8622). The mechanical record obtained before and after the infusion of 1 ml of the dilutions (simple and succussed) was later used for the measurement of Systolic force (SF). This parameter was measured with respect to paper speed of Oscillograph and calibration of the isotonic transducer.

II) Data analysis:

All measured values of systolic force were used for the calculation of their average and standard error. The statistical comparison was however made between the effect of simple and succussed dilutions by using students t-test at a significance level of 0.05. General linear model test and ANOVA was also used for multiple testing of the presented data.

RESULTS

II) Effects of simple dilutions:

SD of Adr (10⁻³ to 10⁻³⁶) have been found to increase the average values of systolic force (SF) at most of the dilutions except 10⁻⁷, 10⁻¹⁰, 10⁻³⁴, 10⁻²⁷ and 10⁻³³ when compared with their respective controls (Table 1). This increase was found maximum at 10⁻⁴ i.e., 26% higher than control being the normal effect of Adr.

However, at 10⁻⁷, 10⁻¹⁰, 10⁻²⁴, 10⁻²⁷ and 10⁻³³, SF was found lower than control, thus representing the reverse (opposite to the normal) effect of Adr on this parameter. This decrease was found maximum at 10⁻²⁷, which was 5% lesser than control.

II) Effects of succussed dilutions:

Similarly, when SUD were used the average values of SF have also been found to increase mostly obtained as percent of control. This increase was found maximum at 10⁻⁴, i.e., 23% of control (Table 1). However, at 10⁻⁵, 10⁻⁶, 10⁻⁸ and 10⁻¹² dilutions, the SF was found lower than their respective controls, thus representing the reverse effect of Adr. This reverse effect was found maximum at 10⁻⁸ having 5% lesser value as compare to its respective control.

III) Comparison between the effects of simple and succussed dilutions:

Statistical comparison between the effects of various SD and SUD of Adr on the average values of SF demonstrated significant difference at 10⁻³ (P<0.005), 10⁻⁵ (P<0.0005), 10⁻⁶ (P<0.01), 10⁻⁷ (P<0.025), 10⁻¹¹ (P<0.025), 10⁻²⁷ (P<0.025) and 10⁻³⁶ (P<0.025).
Table 1. Statistical comparison between the effect of various simple and succussed dilutions of Adrenaline on the average values of Systolic Force.

<table>
<thead>
<tr>
<th>ADRENALINE DILUTIONS</th>
<th>SYSTOLIC FORCE (Percent of Control)</th>
<th>SIGNIFICANCE LEVEL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SIMPLE</td>
<td>SUCCUSED</td>
</tr>
<tr>
<td>1x or 10^{-3}</td>
<td>122.84</td>
<td>102.76</td>
</tr>
<tr>
<td>2x or 10^{-4}</td>
<td>126.21</td>
<td>123.00</td>
</tr>
<tr>
<td>3x or 10^{-5}</td>
<td>116.47</td>
<td>*96.45</td>
</tr>
<tr>
<td>4x or 10^{-6}</td>
<td>111.76</td>
<td>*99.31</td>
</tr>
<tr>
<td>5x or 10^{-7}</td>
<td>*99.48</td>
<td>108.77</td>
</tr>
<tr>
<td>6x or 10^{-8}</td>
<td>100.5</td>
<td>*95.71</td>
</tr>
<tr>
<td>7x or 10^{-9}</td>
<td>104.83</td>
<td>110.76</td>
</tr>
<tr>
<td>8x or 10^{-10}</td>
<td>*96.53</td>
<td>103.49</td>
</tr>
<tr>
<td>9x or 10^{-11}</td>
<td>102.71</td>
<td>113.51</td>
</tr>
<tr>
<td>10x or 10^{-12}</td>
<td>103.39</td>
<td>*99.37</td>
</tr>
<tr>
<td>13x or 10^{-15}</td>
<td>104.38</td>
<td>101.79</td>
</tr>
<tr>
<td>16x or 10^{-18}</td>
<td>101.11</td>
<td>100.58</td>
</tr>
<tr>
<td>19x or 10^{-21}</td>
<td>104.69</td>
<td>110.89</td>
</tr>
<tr>
<td>22x or 10^{-24}</td>
<td>*99.32</td>
<td>104.69</td>
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<tr>
<td>25x or 10^{-27}</td>
<td>*95.72</td>
<td>107.63</td>
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<td>28x or 10^{-30}</td>
<td>105.96</td>
<td>101.64</td>
</tr>
<tr>
<td>31x or 10^{-33}</td>
<td>*99.32</td>
<td>103.65</td>
</tr>
<tr>
<td>34x or 10^{-36}</td>
<td>108.38</td>
<td>100.58</td>
</tr>
</tbody>
</table>

* Reverse effect of Adr., All values are presented as mean ± standard error, Figures in parenthesis represents the number of observations.

DISCUSSION

The homeopathic concept of succussion tested in the present study has demonstrated difference in the effects of simple and succussed dilutions on cardiac parameters. Basically, it reflects the difference among their preparation method and drug water interaction (Gibson, 1968). Consequently, it is responsible for a change in parent drug molecule differing for simple and succussed dilutions.

Potency means power or strength (Le Roy, 1998). Succussion is essential part of the potentization process (Hughes, 2003). Presented result also demonstrates this potentization effect, but non-significantly at most of them and significantly at few dilutions (Fig. 1 and 2). It has been reported earlier that, in high-energy collision, particles may be created or destroyed (New encyclopedia Britannica as quoted by Dutta, 1991). Thus, in the present study the potency of substances is pronounced at some dilutions and not throughout the series ranging from 10^{-3} to 10^{-36}. Further, both the simple and succussed dilutions did not potentize their effect at high dilution as reported for homeopathic concept (Aabel et al., 2001). However, at some of the individual dilutions 10^{-9}, 10^{-11} and 10^{-21} the potentization of their effect has been observed when compared between simple and succussed ones (Fig. 1). Interestingly, the effect of dilution (either simple or succussed) remains after dilution upto 10^{-24} (i.e., beyond Avagadro’s number) where the presence of original drug molecule has been totally rejected in principle. According to Weis and Weis (1986), low concentration (high dilution) of cadmium was more potent for fin regeneration in fish.
Such effects observed at high dilutions support the earlier work done on the physical aspect of simple and succussed dilution (Mathur-De Vre, 1979; Jerman et al., 1999; Aabel et al., 2001; Dutta, 1991; Milgron et al., 2001; Hughes, 2003). These results were further analyzed by testing ANOVA. It demonstrated non-significant difference between both groups of dilution (SD and SUD) but significant differences among various dilutions ranging from \(10^{-3}\) to \(10^{-36}\) and between group and various dilutions. This analysis indicates that the effect of potentization or succussion cannot be equivocally claimed. Therefore, recommendation of succussion as one of the mystery of universe (Bruce et al., 2002) is correct.

In addition, the reverse effect of Adr observed on systolic force at different SD and SUD (Fig. 1), infact represents changes in physical and chemical properties of drug when interacted with water molecules (Michael, 2003). However, this reverse effect was not statistically significant in the present study at any specific dilution throughout the series (Table 1, all values marked with asterisks).

Further SD of Adr also showed reverse effect at some of its high dilutions (Fig. 1). It is however against the proposal of Dutta (1991), that “light isotropic model”, explain the process of SD as friction less process with no heat added or subtracted, and thus, changes of energy of the system remains zero. Therefore, the reverse effects of SD observed on cardiac parameters compels to invite attention to explore the possibility of changes in drug molecules in dilution prepared serially without adding energy into it (succussion) with a possible interaction with water.
COMPARATIVE EFFECT OF SIMPLE & SUCCUSSED DILUTIONS OF ADRENALINE ON SYSTOLIC FORCE OF ISOLATED PERFUSED RABBIT’S HEART

ADRENALINE $10^{-5}$

SIMPLE

ADRENALINE $10^{-5}$

SUCCUSSED

SIMPLE

ADRENALINE $10^{-6}$

SUCCUSSED

SIMPLE

ADRENALINE $10^{-7}$

SUCCUSSED

SIMPLE

ADRENALINE $10^{-11}$

SUCCUSSED

SIMPLE

ADRENALINE $10^{-27}$

SUCCUSSED

SIMPLE

ADRENALINE $10^{-36}$

SUCCUSSED

The Statistical Data of above records is shown in Table 1

Fig.2. Comparative effect of simple and succussed dilutions of adrenaline on systolic force of isolated perfused rabbit’s heart.
CONCLUSION

Both simple and succussed dilutions reported to have differences in terms of their physical nature and the present study confirms these differences in their normal, potentized and reverse effects on cardiac tissues. Thus, a possibility for the presence of reprints of original or parent drug molecule at high dilutions (simple and succussed), cannot be ignored. While the potentization and reverse effects of both SD and SUD that are not consistently observed indicates the instability of reprints of the parent drug molecule.

REFERENCES


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