Evaluation of Excessive Honey Intake on Litter Size and Fetal Viability in Wistar Rats

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Abstract: The purpose of this research was to determine the effect of excessive honey intake on litter size, weight and viability of fetuses in Wistar Rats. Fifteen adult female Wistar rats weighing 220±5g were divided into three groups of two experimental and one control (n=5). The two experimental groups were administered with single oral doses of honey 5ml/kg body weight and 7ml/kg body weight respectively on the 7th day (first trimester) of gestation. Fetuses of experimental and control were collected from the pregnant animals on the 20th day of gestation by hysterectomy and compared for litter size, weight and viability. It was observed that excessive honey intake in the first trimester of gestation caused reduction in litter size, weight and none viable fetuses. None of the experimental rats treated with 5ml/kg body weight delivered more than three fetuses and those treated with 7ml/kg body weight more than two fetuses. None of the fetuses of the experimental groups was viable; all died few hours after delivery. Excessive intake of honey during the first trimester of gestation is embryo toxic.

Key words: Honey · Excessive · Litter Size · Viability

INTRODUCTION

Since ancient times, honey has been used for its medicinal properties in many cultures [1]. Currently, information on the use of honey for the treatment of many human diseases can be found in magazines, bee keeping journals [2] and natural products leaflets, suggesting a wide variety of unfounded properties. In contrast, medical reports supported by tests are few and far between [1, 3-5]. Honey is also considered a part of traditional medicine [6]. It is effective in the healing of wounds and burns and the treatment of diabetic ulcers [7-11]. Honey is produced from many floral sources and its content and activity vary with its origin and processing technique. Histological studies of honey applied to wounds have been reported to be safe [12, 13] as it reduces inflammation in deep [12] and superficial [14] burns as well as in wounds [15]. At a concentration of 1%, it stimulates growth of monocytes in cell cultures to release cytokines, tumour necrosis factor (TNF)-alpha, interleukin (IL)-1 and IL-6, which activate the immune response to infection [16]. The proliferation of peripheral blood B-lymphocytes and T-lymphocytes in cell culture has also been stimulated by honey concentration as low as 0.1% [17]. The bacterial destroying activity of macrophages may have been assisted by the carbohydrate content of honey principally, glucose and fructose [18] and by its pH [19] which is between 3 and 4. Honey is said to have an inhibitory effect to several species of bacteria including aerobes and anaerobes, gram-positives and gram-negatives [20] and an antifungal action on some yeasts and species of Aspergillus and Penicillium [21], as well as some dermatophytes [22]. Wounds infected with Pseudomonas, showing resistance to several antibiotics, have been rapidly cleared of infection with honey and allowing successful skin grafting [23]. Application of honey to open wounds has been reported to be soothing [24] to relieve pain [24] and with no adverse effects [25]. The purpose of this study is to establish the influence of excessive dose of honey on the embryos and fetuses of Wistar rats.

MATERIALS AND METHODS

Fifteen adult female Wistar rats were used for this research. The rats were collected from the Animal House...
of the College of Medicine, Ambrose Alli University, Ekpoma, Edo State Nigeria. They weighed between 220±5g and were acclimatised for two weeks, had access to water ad libitum. Feeds (growers) were obtained from Bendel Flour Mills Plc, Ewu, Edo State and honey was purchased locally from M.C Super Market Ekpoma. The animals were caged separately for the purpose of identification. The experimental protocol for animal research was approved by the ethics committee of the College of Health Sciences, Delta State University, Abraka.

**Experimental Design:** Ten rats were used as experimental and five as control. They were divided into three groups of two experimental and one control of five rats per group. The experimental rats were administered with excessive single doses of bee honey.

**Group 1:** Rats were administered with a single dose of 5ml/kg body weight of bee honey through orogastric tube (gavage) on day 7th of gestation.

**Group 2:** Rats were administered with single higher dose of 7ml/kg body weight on day 7th of gestation through same route.

**Group 3:** Served as control.

A daily saline lavage was done to determine the predominant epithelial cells present in the vagina, that is, 1ml of normal saline was introduced into the vagina with a pipette and vaginal swab was taken and drops were placed on clean slides and were viewed under the microscope for stages of the uterus oestrus cycle. The predominant presence of uniformly large nucleated cells indicated pro-oestrus stage (the stage of the oestrus cycle which the female is receptive to the male). Cornified cells indicated oestrus (ovulation) and the predominant presence of leucocytes with or without epithelial cells signified dioestrous 1/dioestrus 2 stages. Female rats are not receptive to males at the latter three stages.

Pro-oestrus females were mated with normal males over the night. Presence of sperm plug in the vaginal swab at oestrus indicated successful mating and this was taken as day zero of gestation. The rats were weighed on day zero and weighed again on day 7; weight reduction on the later day (day-7) confirms pregnancy.

The 7-day pregnant rats were administered with the appropriate doses of honey. On the 20th day of gestation, they were sacrificed by guillotine decapitation and foetuses delivered by hysterectomy. Litter sizes and viability of the experimental and control groups were noted and compared.

**Statistics:** One way ANOVA by Graph PadInstat version 2.

**RESULTS**

We observed gross reduction in litter size and weight in all the experimental animals as compared with control. None of the experimental rats treated with 5ml/kg body weight delivered more than three fetuses and the group treated with 7ml/kg body weight more than two fetuses. The fetuses of the two experimental groups have mean weights of 3.25g and 3.09g respectively, while the control had a mean weight of 4.58g. None of the fetuses of the experimental groups was viable; all died few hours after delivery. The control group had viable fetuses. One of the experimental gestational animals in group 1 and two in group 2 did not sustain their pregnancy to term. They lost their pregnancies before term; the fetuses were either absorbed or aborted.

**DISCUSSION**

The main focus of this research was to determine the effect of excessive intake of honey on litter size, weight and viability of fetuses in Wistar rats. Order works have focused on the health benefit of honey intake [26-28]. The research revealed that excessive honey intake during gestation reduces litter size, fetal weight and viability. There was significant difference between the experimental and control animals in all the parameters measured (litter size, weight and viability). Results of this investigation also revealed that consumption of large quantity of honey during the first trimester of pregnancy causes abortion or absorption of fetuses. This was made evident by some of the experimental animals which were pregnant when honey was administered but lost the pregnancy few days after honey administration. This may

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Group 1 (mean±SD)</th>
<th>Group 2 (mean±SD)</th>
<th>Group 3 (mean±SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Litter size</td>
<td>2±1.23</td>
<td>1±1.00</td>
<td>7.8±1.48*</td>
</tr>
<tr>
<td>Viability</td>
<td>0±0.00</td>
<td>0±0.00</td>
<td>7±0.45*</td>
</tr>
<tr>
<td>Foetal weight (gram)</td>
<td>3.25±0.19</td>
<td>3.09±0.08</td>
<td>4.58±0.19*</td>
</tr>
</tbody>
</table>

*Values were significant at p < 0.001. Values were mean±SD. N = 5.
be as a result of premature uterine contractions induced by honey. It was also made evident by litter size reduction of those that sustained their pregnancy to term. There have been no known previous investigations in this area of study to compare and contrast our findings. Consumption of large quantity of honey in the first trimester of gestation is harmful to the developing embryo and fetus. Although, we do not look at the teratological effect on individual organs in our research, it is possible that some of the vital organs such as the heart, lungs, kidneys and the brain may have been affected. We did not observe any visible external defects on the bodies of the litters of the experimental groups of animals; however, they appeared smaller and weighed less than the control. The experimental rats which did not sustain their pregnancy to term may have aborted all their fetuses.

**CONCLUSION**

Excessive dose of honey intake in the first trimester of pregnancy is harmful to the embryo and fetal development. Expectant mothers are advised to minimize honey intake during the first trimester of pregnancy.

**REFERENCES**


