Transethosome gel of orange (*Citrus sinensis* L.) peel extract for atherosclerosis prevention by total cholesterol reduction

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## BACKGROUND

Atherosclerosis can cause ischemic heart disease and stroke, both of which are the first and third causes of death. The percentage of deaths due to atherosclerosis reaches 18.4-69.5% in various countries, mostly in Europe. (Yoshino et al., 2006).

Piles of orange waste are estimated at 15-25 million tonnes per year, with the highest accumulation of orange peels reaching 44% per year. (Wikandari et al., 2015)

There are many flavonoids in sweet orange peel, such as hesperidin, neohesperidin, naringin, and nobiletin (M’hiri et al., 2017). This compound can reduce the risk of atherosclerosis through its ability to modulate fat metabolism (Mulvihill et al., 2016).

The aim of this study was to use waste stuff around us that can be potentially useful for atherosclerosis.

## OBJECTIVES

1. Predicting the extract of orange peels for atherosclerosis.
2. Knowing the penetration of orange peel transethosomal gel.
3. Predicting the formulation used to prevent atherosclerosis.

## METHODS

**Study Design**

- **Keywords**
- **Inclusion Exclusion**
- **Sortage**
- **Data Extraction**

**Data Collection**

Identification was carried out on 4839 articles from selected keywords in 3 databases. After sorting its titles and abstracts, as well as the exclusion and inclusion requirements, a total of 134 articles have the potential to be read fully. Finally, 16 articles have eligibility, and the data was used.

## RESULTS

**Extraction Method**

- Ethanol 80%
- Microwave Assisted Extraction
- Hesperidin, and other flavonoid

**Mechanism**

*Hesperidin can reduce LDL, foam cell, and atherosclerotic plaque.*

**Transethosome**

Transethosome is a combination of ethosomes containing phospholipids, ethanol, water, and transfersomes, which contains an edge activator with added surfactants to enhance deformation ability and increase the space between cells between corneocytes so that it can go systemic (Kumar et al., 2019).

**Gel Formulation**

<table>
<thead>
<tr>
<th>Composition</th>
<th>Usage Range</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orange Peel Extract</td>
<td>1-5%</td>
<td>Active Ingredient</td>
</tr>
<tr>
<td>Phospholipid</td>
<td>3.2-5.2%</td>
<td>Carrier</td>
</tr>
<tr>
<td>Ethanol 98%</td>
<td>Up to 30%</td>
<td>Penetration Enhancer</td>
</tr>
<tr>
<td>Sodium</td>
<td>~5% for transferosome</td>
<td>Edge Activator</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>1-10% (Emulgator)</td>
<td>Emulgator</td>
</tr>
<tr>
<td>Methanol dim Chloroform Mixture (1:1)</td>
<td>-</td>
<td>Cosolvent</td>
</tr>
<tr>
<td>Water</td>
<td>-</td>
<td>Cosolvent</td>
</tr>
</tbody>
</table>

We found three formulations that could be the source, including Orange Fruit Peel's Ethanol Extract Peel-Off Gel Mask, Quercetin's ethosomal gel, and he closest to our formulation, Fisetin's transethosomal gel (flavonoid).

The choice of materials used in the formulation design has been monitored for their bioavailability, efficacy, and adaptation to Indonesian ingredients' availability. It is hoped by comparing the existing formulations, a transethosome gel formulation from orange peel extract will be obtained, that can be used to prevent atherosclerosis.

## CONCLUSION

The orange peel extract can be applied in the form of a transethosome gel which is effective in preventing atherosclerosis.

## REFERENCES