**Table S1 Risk assessment based on RPN score applying FMEA**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Target | PFM | Potential Effect of Failure/S | S | Potential Cause of Failure/S | O | Control Process | D | CC | PRN |
| **NLCs** | Ultrasonication/Ultrasound  Amplitude | Poor nanostructure of particle and instability of particles | **6** | Lipid particles unable to reduce at the desired size | **4** | Regular maintenance and supervision | **1** | Y | **24** |
| Speed of homogenizer | Unable to get homogeneous pre-emulsion | **4** | Damage of homogenizer | **3** | Regular maintenance and supervision | **1** | N | **12** |
| Speed of magnetic stirrer | Unable to obtain a homogeneous preparation | **3** | Damage of stirrer or motor | **2** | Regular maintenance and supervision | **2** | N | **12** |
| Temperature | None | **1** | High temperature might because of failure | **3** | Maintaining the required temperature | **2** | N | **6** |
| Humidity | None | **1** | Humidity might because of failure | **3** | Should maintain the humidity | **2** | N | **6** |
| Solid lipid | Difficult to soluble drug fraction of unable to obtain desired size of particle and EE | **4** | Low quantity may cause less encapsulation efficiency. | **2** | Optimum amount of solid lipid required to obtain minimum particle size and maximum EE | **3** | Y | **24** |
| Surfactant | Difficult to the obtained desired size of particle and stability | **4** | Less amount of surfactant/ co-surfactant unbalancing the system | **2** | Surfactant and co-surfactant added to enhance the minimum particle size and stability | **4** | Y | **32** |
| Liquid lipid (Oil) | High pay load of drug is affected | **4** | Less quantity of oil might be the cause of failure | **2** | Optimum quantity of oil to be added with solid lipid to enhance the encapsulation of drug | **3** | Y | **24** |

PFM: Potential Failure Mode; Severity Rating: S; Occurrence Rating: O; Detection Rating: D; Risk Priority Number: PRN; Critical Characteristic: CC