Furthermore, the over fortified formulations may overwhelm the digestive tract with non-soluble lipophilic compounds leading to indigestion.

[0005] Accordingly, there is a need for nutritional compositions for infants, toddlers, children and adults that provide necessary lipophilic compounds in a more stable soluble form.

SUMMARY OF THE INVENTION

[0005a] A method of preparing a nutritional composition having at least one lipophilic compound having improved bioavailability, the method comprising the steps of:

providing a premix comprising an assembly that comprises at least one hydrophobic protein having a grand average of hydropathicity index (GRAVY) value of -0.5 to 0, a combination of monoglycerides and diglycerides ("MDG"), and at least one lipophilic compound, wherein the assembly (i) is water soluble wherein at least 5% of the assembly remains in an aqueous phase after centrifugation at 31,000 x g for at least 1 hour at 20 °C; and (ii) has a size of 60 kD to 1000 kD;

adding the premix to an aqueous solution to form an activated premix; and

adding the activated premix to the nutritional composition.

[0005b] A method of preparing a nutritional composition having at least one lipophilic compound having improved bioavailability, the method comprising the steps of:

providing a protected premix comprising an assembly that comprises at least one hydrophobic protein having a grand average of hydropathicity index (GRAVY) value of -0.5 to 0, a combination of monoglycerides and diglycerides ("MDG"), at least one lipophilic compound, and a surfactant, wherein the assembly (i) is water soluble wherein at least 5% of the assembly remains in an aqueous phase after centrifugation at 31,000 x g for at least 1 hour at 20 °C; and (ii) has a size of 60 kD to 1000 kD;

adding the protected premix to a fat-containing solution to form an MDG-protected component; and

adding the MDG-protected component to the nutritional composition.

[0006] In one aspect, the disclosure may be directed to a nutritional composition having at least one protein, at least one fat, and at least one lipophilic compound, the composition comprising: an activated assembly comprising at least one hydrophobic protein, at least one

[0007] combination of monoglycerides and diglycerides ("MDG") and at least one lipophilic compound, wherein at least 1% of the total MDG in the nutritional composition remains in the aqueous phase after centrifugation at 100,000 x g for 1 hour at 20 °C.

[0008] In another aspect, the disclosure may be directed to a nutritional composition having at least one protein, at least one fat, and at least one lipophilic compound, the composition comprising: an activated assembly comprising at least one hydrophobic protein, at least one combination of monoglycerides and diglycerides ("MDG") and at least one lipophilic compound, wherein at least 1% of the total MDG in the nutritional composition remains in the aqueous phase after centrifugation at 100,000 x g for 1 hour at 20 °C, wherein the assembly is (i) water soluble; and (ii) has a size of 100 kD to 1000 kD.

[0009] In another aspect, the disclosure may be directed to a nutritional composition having at least one protein, at least one fat, and at least one lipophilic compound, the composition comprising: an activated assembly comprising at least one hydrophobic protein, at least one combination of monoglycerides and diglycerides ("MDG") and at least one lipophilic compound, wherein at least 1% of the total MDG in the nutritional composition remains in the aqueous phase after centrifugation at 100,000 x g for 1 hour at 20 °C, wherein the assembly is (i) water soluble; and (ii) has a size of 100 kD to 1000 kD, wherein MDG increases the concentration of protein of the assembly by at least 2% compared to a nutritional composition without MDG.

[0010] In another aspect, the disclosure may be directed to a nutritional composition having at least one protein, at least one fat, and at least one lipophilic compound, the

Furthermore, the over fortified formulations may overwhelm the digestive tract with non-soluble lipophilic compounds leading to indigestion.

[0005] Accordingly, there is a need for nutritional compositions for infants, toddlers, children and adults that provide necessary lipophilic compounds in a more stable soluble form.

SUMMARY OF THE INVENTION

[0005a] A method of preparing a nutritional composition having at least one lipophilic compound having improved bioavailability, the method comprising the steps of:

providing a premix comprising an assembly that comprises at least one hydrophobic protein having a grand average of hydropathicity index (GRAVY) value of -0.5 to 0, a combination of monoglycerides and diglycerides ("MDG"), and at least one lipophilic compound, wherein the assembly (i) is water soluble wherein at least 5% of the assembly remains in an aqueous phase after centrifugation at 31,000 x g for at least 1 hour at 20 °C; and (ii) has a size of 60 kD to 1000 kD;

adding the premix to an aqueous solution to form an activated premix; and

adding the activated premix to the nutritional composition.

[0005b] A method of preparing a nutritional composition having at least one lipophilic compound having improved bioavailability, the method comprising the steps of:

providing a protected premix comprising an assembly that comprises at least one hydrophobic protein having a grand average of hydropathicity index (GRAVY) value of -0.5 to 0, a combination of monoglycerides and diglycerides ("MDG"), at least one lipophilic compound, and a surfactant, wherein the assembly (i) is water soluble wherein at least 5% of the assembly remains in an aqueous phase after centrifugation at 31,000 x g for at least 1 hour at 20 °C; and (ii) has a size of 60 kD to 1000 kD;

adding the protected premix to a fat-containing solution to form an MDG-protected component; and

adding the MDG-protected component to the nutritional composition.

[0006] In one aspect, the disclosure may be directed to a nutritional composition having at least one protein, at least one fat, and at least one lipophilic compound, the composition comprising: an activated assembly comprising at least one hydrophobic protein, at least one

combination of monoglycerides and diglycerides ("MDG") and at least one lipophilic compound, wherein at least 1% of the total MDG in the nutritional composition remains in the aqueous phase after centrifugation at 100,000 x g for 1 hour at 20 °C.

[0007] In another aspect, the disclosure may be directed to a nutritional composition having at least one protein, at least one fat, and at least one lipophilic compound, the composition comprising: an activated assembly comprising at least one hydrophobic protein, at least one combination of monoglycerides and diglycerides ("MDG") and at least one lipophilic compound, wherein at least 1% of the total MDG in the nutritional composition remains in the aqueous phase after centrifugation at 100,000 x g for 1 hour at 20 °C, wherein the assembly is (i) water soluble; and (ii) has a size of 100 kD to 1000 kD.

[0008] In another aspect, the disclosure may be directed to a nutritional composition having at least one protein, at least one fat, and at least one lipophilic compound, the composition comprising: an activated assembly comprising at least one hydrophobic protein, at least one combination of monoglycerides and diglycerides ("MDG") and at least one lipophilic compound, wherein at least 1% of the total MDG in the nutritional composition remains in the aqueous phase after centrifugation at 100,000 x g for 1 hour at 20 °C, wherein the assembly is (i) water soluble; and (ii) has a size of 100 kD to 1000 kD, wherein MDG increases the concentration of protein of the assembly by at least 2% compared to a nutritional composition without MDG.

[0009] In another aspect, the disclosure may be directed to a nutritional composition having at least one protein, at least one fat, and at least one lipophilic compound, the