UNIVERSIDADE FEDERAL DE LAVRAS

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REDUÇÃO DE SÓDIO EM ALIMENTOS: UMA ANÁLISE NA PERSPECTIVA DO COMPORTAMENTO DO CONSUMIDOR

LAVRAS – MG
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Tese apresentada à Universidade Federal de Lavras, como parte das exigências do Programa de Pós-Graduação em Ciência dos Alimentos, área de concentração Ciência dos Alimentos, para a obtenção do título de Doutora.

Prof. Dr. João de Deus Souza Carneiro
Orientador

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SODIUM REDUCTION IN FOODS: AN ANALYSIS IN THE
PERSPECTIVE OF CONSUMER BEHAVIOR

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LAVRAS - MG
2017

Ao meu grande amor e amigo, Diego,

pelo apoio e por caminhar comigo

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Dedico

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"Onde quer que exista uma necessidade, há uma oportunidade". (Philip Kotler)

RESUMO GERAL

Grandes esforços têm sido realizados visando reduzir o consumo de sódio devido à sua correlação positiva com a incidência de doenças. Entender o comportamento do consumidor é uma maneira de se alcançar esse propósito. O objetivo geral desse trabalho foi gerar informações a respeito do comportamento dos consumidores em relação à redução no consumo de sódio, por meio das técnicas de intervenção educativa, grupo de foco e análise conjunta de fatores. Foi comparada a efetividade de diferentes formas de intervenção educativa em relação à melhoria do conhecimento dos consumidores sobre o sódio e, também, sobre o rótulo de produtos processados com redução de sódio. Foram utilizadas três intervenções educativas diferentes: aprendizagem ativa (AL), aprendizagem passiva (PL) e aprendizagem passiva com efeito de autoridade (PA). Cada intervenção teve uma abordagem branda e agressiva. Os voluntários foram submetidos a uma das seis intervenções. A análise conjunta foi utilizada para avaliar a influência de três variáveis independentes, na intenção dos consumidores de comprar produtos processados com redução de sódio. Através do grupo de foco, foram selecionados três fatores para a confecção dos rótulos: produto (calabresa, frescal e queijo parmesão), alegações (menos 25% de sódio, menos sódio e light), cor (azul, verde, vermelho). Nove imagens de rótulos foram apresentadas a 745 consumidores, que foram solicitados a avaliar a intenção de compra de cada um deles. As intervenções educativas foram igualmente eficientes para a compreensão dos participantes sobre as questões objetivas sobre o sódio e o rótulo. Para as questões subjetivas, que se referem ao comportamento dos participantes e intenção de compra, a intervenção educativa de AP foi ligeiramente melhor do que as outras. A abordagem agressiva mostrou-se mais eficiente em comparação com a abordagem branda. A intervenção educativa desempenhou um papel eficaz na melhoria da compreensão dos consumidores sobre os danos causados pela ingestão excessiva de sódio. Através da análise conjunta, verificou-se que a compra foi intencionalmente afetada pelas alegações, tipo de produto e cor do rótulo. Os grupos com maior importância relativa para as alegações foram os grupos formados por homens (ativos e sedentários). A alegação '25% menos sódio', o produto 'queijo frescal' e a cor 'azul' teve um impacto maior na intenção de compra para a maioria dos grupos avaliados. A alegação 'light', produto 'queijo parmesão' e a cor 'vermelho' teve um impacto menor sobre a intenção de compra para todos os grupos avaliados.

Palavras-chave: Intervenção educativa. Análise conjunta de fatores. Grupo de foco.

GENERAL ABSTRACT

Great efforts have been made to reduce sodium intake due to its positive correlation with disease incidence. Understanding consumer behavior is one way to achieve this. The general objective of this work was to generate information about the behavior of consumers in relation to reduction in sodium consumption through the techniques of educational intervention, focus group and joint analysis of factors. The effectiveness of different forms of educational intervention was compared in relation to the improvement of consumers' knowledge about sodium and also on the label of products processed with sodium reduction. Three different educational interventions were used: active learning (AL), passive learning (PL) and passive learning with authority effect (PA). Each intervention had a soft and aggressive approach. The volunteers were submitted to one of six interventions. The joint analysis was used to evaluate the influence of three independent variables on consumers' intention to buy processed products with sodium reduction. Through the focus group, three factors were selected for the preparation of the labels: product (pepperoni, frescal cheese and parmesan cheese), claims (25% less sodium, less sodium and light), color (blue, green, red). Nine label images were presented to 745 consumers, who were asked to evaluate the purchase intent of each of them. Educational interventions were equally effective in understanding participants' objective questions about sodium and the label. For subjective questions, which refer to participants' behavior and purchase intent, AP's educational intervention was slightly better than the others. The aggressive approach proved to be more efficient compared to the soft approach. Educational intervention has played an effective role in improving consumer understanding of the damage caused by excessive sodium intake. Through the joint analysis, it was verified that the purchase was intentionally affected by the claims, type of product and color of the label. The groups with the highest relative importance for the claims were the groups formed by men (active and sedentary). The claim "25% less sodium", the product "frescal cheese" and the "blue" color had a greater impact on the intention of purchase for most of the evaluated groups. The claim "light", product "parmesan cheese" and the "red" color had a minor impact on the purchase intention for all groups evaluated.

Keywords: Educational Intervention. Conjoint Analysis. Focus Group.

SUMÁRIO

PRIMEIRA PARTE

1 INTRODUÇÃO

Nas últimas décadas, aumentou-se a preocupação com o consumo excessivo de sódio, devido a sua correlação com diversas doenças, principalmente doenças cardiovasculares. O sódio (Na) é consumido, na maioria das vezes, na forma de cloreto de sódio (NaCl). A Organização Mundial de Saúde (WHO), recomendou em 1990, uma limitação da ingestão diária média de NaCl a 6 g por dia para adultos (WHO, 1990). Dezessete anos depois, a OMS reduziu essa limitação e recomendou a redução da ingestão diária de cloreto de sódio para 5 g por dia (WHO, 2007). Contudo, uma pesquisa do Ministério da Saúde (BRASIL, 2011) constatou que o brasileiro consome, em média, 12 g de cloreto de sódio/dia, o que equivale a 4800 mg de Na/dia, sendo este consumo maior que o dobro do limite recomendado pela Organização Mundial de Saúde (WHO, 1990), o que corresponde a aproximadamente 2000 mg de sódio por dia. Esse panorama evidencia a necessidade de entender como os consumidores se comportam frente a essa problemática, e destaca a importância de educar o consumidor a respeito da redução de sódio.

Estudar o comportamento do consumidor é entender como e por que, os consumidores se comportam de determinada maneira, em determinada situação, além de investigar os fatores que influenciam nesse comportamento, fornecendo assim, dados e informações para uma tomada de decisão (BLACKWELL; MINIARD; ENGEL, 2008; SOLOMON, 2011).

Dessa forma, o conhecimento do comportamento do consumidor é uma importante estratégia para se definir diretrizes, como campanhas publicitárias de conscientização dos consumidores a respeito dos riscos da elevada ingestão de cloreto de sódio e; conscientização para a redução do consumo de sódio;

desenvolvimento de produtos com redução de sódio que satisfaçam os anseios e necessidades dos consumidores. Com o objetivo de entender, estimar e até mesmo mensurar o comportamento do consumidor, técnicas são usadas como, por exemplo, a intervenção educativa (SAMANT; CRANDALL; SEO 2016a), análise conjunta de fatores e grupo de foco (LIMA FILHO et. al., 2015), pesquisa de hábito de consumo (MUSARSKAYA; BIRCH; MEMERY, 2017) e intenção de compra (ABRANTES, AVILA; FARIA, 2010).

A intervenção educativa é uma eficiente maneira de se conscientizar os consumidores sobre diversos temas, tais como os problemas relacionados ao consumo excessivo de sódio. Além disso, essa ferramenta pode ser utilizada para ensinar ao consumidor como observar os rótulos de produtos com redução de sódio.

A intervenção educativa pode ser realizada usando uma aprendizagem 'passiva' ou 'ativa'. Na aprendizagem passiva o conhecimento é adquirido por meio de ensino didático, onde não há resistência ao que é aprendido (HAIDET et al., 2004; KRUGMAN; HARTLEY, 1970). Por exemplo, os consumidores podem aprender, lendo panfletos educacionais. No modo de aprendizagem ativa, a ênfase é dada na comunicação dinâmica entre os aprendizes, em relação a um assunto a ser aprendido (HAIDET et al., 2004).

Por meio da intervenção educativa, o consumidor pode ser sensibilizado para os efeitos nocivos do excesso de consumo de sódio e, também, para ensiná-los a identificar a presença de sódio por meio dos rótulos de alimentos processados, uma vez que o rótulo é frequentemente a maior forma de informação nutricional utilizada pelos consumidores (CAMPOS; DOXEY; HAMMOND, 2011).

Segundo Grimes, Riddell e Nowson (2009), poucos estudos examinaram a capacidade do consumidor de interpretar informações nutricionais relacionadas com o teor de sódio descrito nos rótulos de produtos alimentícios. De forma

consistente, em todos os estudos, os consumidores criticam o uso da terminologia científica 'sódio', nos rótulos nutricionais dos alimentos (GRUNERT; WILLS, 2007, SCOTT; WORSLEY, 1997). Além disso, muitos consumidores não têm o conhecimento necessário para converter o teor de sódio em teor de cloreto de sódio e, portanto, não podem interpretar com precisão a informação sobre a quantidade de sódio nos alimentos (GILBEY; FIFIELD, 2006). Dessa forma, grande necessidade existe em conhecer as necessidades dos consumidores em relação aos rótulos de produtos alimentícios com redução de sódio.

Um dos métodos de pesquisa que pode ser utilizado para se obter as opiniões e atitudes dos consumidores, em relação às embalagens e rótulos de produtos, é a técnica de grupo de foco. O grupo de foco é uma das mais populares formas de pesquisa com consumidores e é definido como uma entrevista cuidadosamente planejada, com o objetivo de obter as atitudes e as opiniões das pessoas a respeito de determinados assuntos, produtos ou serviços (DELLA LUCIA; MINIM, 2006). Por meio do grupo de foco é possível identificar os fatores que impactam a intenção de compra dos consumidores. Entretanto, por meio dele, não é possível quantificar o efeito desses fatores, mas por meio da análise conjunta é possível realizar essa quantificação.

Por meio da análise conjunta de fatores pode-se saber quais os dizeres do rótulo são melhores para expressar que se trata de um produto com redução de sódio, ou qual a cor se remete a esse tipo de produto, e qual produto tem maior apelo na redução de sódio. A análise conjunta de fatores (*conjoint analysis*) é um método com princípios estatísticos que tem sido empregado no estudo do efeito dos fatores do rótulo, sobre a intenção de compra do consumidor. A análise conjunta de fatores foi desenvolvida para investigar os fatores que influenciam a compra de um produto e para estimar a importância desta influência (GREEN; SRINIVASAN, 1978), para qualquer que seja o

produto. Esta técnica é uma das ferramentas mais importantes no auxílio do desenvolvimento de produtos, e na tomada de decisão na área de *marketing* (NATTER; FEURSTEIN, 2002).

Diante desse contexto, o objetivo geral desse trabalho foi gerar informações a respeito do comportamento dos consumidores em relação a redução no consumo de sódio, por meio das técnicas de intervenção educativa, grupo de foco e análise conjunta de fatores.

Especificamente, o objetivo do trabalho foi comparar a eficácia de diferentes formas de intervenção educativa (aprendizagem ativa, aprendizagem passiva e aprendizagem passiva com um efeito autoritário) e a forma como ela é apresentada (branda ou agressiva), a fim de obter informações sobre o conhecimento dos consumidores em relação ao sódio, e também aos rótulos de produtos com baixo teor de sódio. Também objetivou-se avaliar a mudança comportamental desses participantes ao longo das sessões de intervenção em relação ao tipo de intervenção submetida (Artigo 1). Esse trabalho teve também como objetivo, avaliar os fatores que influenciam a intenção de comprar produtos com redução de sódio, por meio de técnicas de grupo de foco e análise conjunta. A informação adquirida neste trabalho será útil para as empresas de alimentos lançarem produtos com sódio reduzido, que satisfaçam as necessidades e desejos dos consumidores. É também importante, que os decisores políticos tomem as alterações necessárias para garantir uma melhor compreensão dos rótulos dos consumidores (Artigo 2).

2 REFERENCIAL TEÓRICO

2.1 Cloreto de sódio e seus impactos na saúde

O cloreto de sódio (NaCl) é um importante ingrediente para a indústria de alimentos. Ele é adicionado aos produtos como conservante e/ou para conferir o gosto salgado. O cloreto de sódio é o sal mais abundante encontrado na natureza, pode ser encontrado como componente natural de alguns alimentos e é a principal fonte de sódio na dieta humana.

A definição de sal para consumo humano, refere-se à NaCl cristalizado, extraídos de fontes naturais, com a adição obrigatória de iodo. O sal deve se apresentar sob a forma de cristais brancos, com grânulos uniformes, livres de odores e possuir o seu sabor característico salgado. Minerais (antiumectantes) podem ser adicionados ao sal, pelos limites estabelecidos por lei (BRASIL, 2000).

O sal de cozinha, NaCl, contém sódio em sua composição. O sódio é o componente mais abundante nos fluidos extracelulares e permite o transporte de nutrientes (GREELEY, 1997). A sua ingestão é essencial, pois contribui para o mecanismo de regulação da pressão arterial, o transporte de água intracelular, transmissão de impulsos nervosos, contração muscular, regulação da pressão osmótica e equilíbrio ácido-base (VIEGAS, 2009). Entretanto, quantidades excessivas têm consequências, como o aumento da pressão arterial (JIMÉNEZ-FLORES, 1997).

Uma pesquisa do Ministério da Saúde (BRASIL, 2011) observou que o brasileiro consome, em média, 12 g de cloreto de sódio/dia (4800 mg de Na/dia), sendo este consumo maior que o dobro do limite considerado saudável pela Organização Mundial de Saúde (WHO, 2007), o que corresponde a aproximadamente 2000 mg de sódio por dia.

Há relatos que o uso excessivo de sódio na dieta está associado com hipertensão, que por sua vez associa-se com as doenças cardiovasculares (HE; MACGREGOR, 2009; TUOMILEHTO et al., 2001). Um relacionamento entre o consumo de sódio, osteoporose e a incidência de pedras nos rins também foi encontrado (HEANEY, 2006; SIHUFE; ZORRILLA; RUBIOLO, 2003; WHO, 2007).

Portanto, os consumidores estão procurando formas de diminuir a ingestão diária de sódio, aumentando assim, a demanda por produtos com reduzido teor de sódio em alimentos (APPEL; ANDERSON, 2010).

Existem várias técnicas para se reduzir o consumo de sódio, como técnicas de desenvolvimento de novos produtos, análise sensorial de alimentos e as técnicas de estudo do comportamento do consumidor. O estudo do comportamento do consumidor é uma importante estratégia para se definir diretrizes para a redução do consumo de sódio. Para tanto, faz-se o uso de técnicas para se conhecer o comportamento dos consumidores, como a intervenção educativa (SAMANT; CRANDALL; SEO, 2016), análise conjunta de fatores e grupo de foco (LIMA FILHO et. al,, 2015), pesquisa de hábito de consumo (MUSARSKAYA; BIRCH; MEMERY, 2017), dentre outras.

2.2 Comportamento do consumidor

O comportamento do consumidor é o estudo dos processos envolvidos em obter, consumir, e dispor de produtos e serviços, incluindo os processos decisórios que antecedem e sucedem estas ações (ENGEL; BLACKWELL; MINIARD, 2000; SOLOMON, 2011), ou seja, é o estudo de como os indivíduos tomam decisões de gastar seus recursos disponíveis (tempo, dinheiro, esforço) em itens relacionados ao consumo (SCHIFFMAN; KANUK, 2000). Entender o comportamento do consumidor é um dos desafios mais complexos para a teoria

de *marketing*, e isso se deve à ampla área de abrangência do campo comportamento do consumidor, de acordo com Kotler e Keller(2006).

De acordo com Kotler (2000), o comportamento do consumidor representa o campo que estuda a forma como pessoas, grupos e organizações selecionam, compram, usam e descartam artigos, serviços, ideias ou experiências, para satisfazer suas necessidades e desejos. Para o autor, o benefício de estudar o comportamento de compra do consumidor é fornecer dados, informações, para a tomada de decisão no desenvolvimento de novos produtos, definição de preços, canais de distribuição e outros elementos que fazem parte do *mix* de *marketing*. Nesse aspecto, o entendimento de produto deve ser amplo, pois inclui toda e qualquer coisa que possa ser utilizada para satisfazer o desejo do consumidor. Dessa forma, serviços, ideias, lugares ou pessoas, também podem ser considerados produtos (KOTLER; KELLER 2006). Nessa perspectiva, o estudo do consumidor evoluiu seu escopo e passou a direcionar-se à análise do consumo e a busca pelo motivo pelo qual as pessoas consomem e de que forma elas compram (SOLOMON, 2011).

2.2.1 Fatores que influenciam o processo de compra

Vários são os fatores que influenciam o processo de tomada de decisão de compra dos consumidores, podendo ser internos ou externos (CHURCHILL JR; PETER, 2000; ENGEL; BLACKWELL; MINIARD, 2000; KOTLER; KELLER, KELLER, 2006; SCHIFFMAN, KANUK, 2000; SOLOMON, 2011). Para Kotler e Keller (2006), uma vez que o propósito do *marketing* centra-se em atender e satisfazer as necessidades e os desejos dos consumidores torna-se fundamental conhecer o seu comportamento de compra.

Para que um consumidor tome a decisão de compra, é preciso que na sua mente, desenvolva-se estados de existência de necessidade, como referenciam

Medeiros e Cruz (2006). Seguindo esse raciocínio, Kotler e Keller (2006) afirma que a decisão de comprar ou usar um serviço é desencadeada pela necessidade básica ou pelo despertar da necessidade de uma pessoa ou empresa.

Para Blackwell, Miniard e Engel (2008), o processo de decisão de compra do consumidor acontece em sete estágios: i) reconhecimento da necessidade; ii) busca de informação; iii) avaliação de alternativas pré-compra; iv) compra; v) consumo; vi) avalição pós-consumo e; vii) descarte.

Segundo Kotler (1998), o consumidor, em seu processo de compra, é influenciado por uma série de fatores, como culturais, sociais, pessoais e psicológicos. Nesse estudo, os fatores psicológicos (percepção, motivação, aprendizagem e atitude) merecem destaque.

2.2.1.1 Percepção

Percepção é o processo pelo qual um indivíduo adquire, interpreta, seleciona e organiza as informações obtidas por meio dos sentidos (PINHEIRO et al., 2015; SCHIFFMAN; KANUK, 2000).

A percepção é definida por Sternberg e Grigorenko (2007) como sendo um conjunto de processos psicológicos, pelos quais as pessoas reconhecem, organizam, sintetizam, conferem e traduzem as sensações recebidas a partir de estímulos captados.

A percepção humana dispõe de filtros perceptivos que permitem selecionar informações. Segundo Pinheiro et al. (2015), os mais importantes filtros são a 'atenção seletiva', relacionado à capacidade do ser humano em selecionar as informações que lhes são submetidas; a 'distorção seletiva', que é a propensão que os consumidores têm de interpretar as informações, a partir de suas crenças e valores, dando-lhes um significado pessoal; e a 'retenção

seletiva', que é a tendência dos seres humanos em armazenar estímulos que reforcem suas crenças e valores.

O uso de estímulos sensoriais como forma de despertar a atenção do consumidor, e levá-lo a construir uma percepção do produto tem chamado a atenção dos profissionais de *marketing* (PINHEIRO et al., 2015).

2.2.1.2 Aprendizagem

A aprendizagem permite uma mudança de comportamento, relativamente permanente, decorrente da experiência (MYERS, 2002). Richers (1984, p. 50), salienta que "o homem é capaz de aprender e alterar os seus comportamentos, por meio da ampla utilização de sua experiência passada do mundo".

O estudo da aprendizagem ajuda a prever o comportamento de compra do consumidor, uma vez que esse comportamento é fruto da aprendizagem social (PINHEIRO et al., 2015).

Segundo Pinheiro et al. (2015), as teorias comportamentais da aprendizagem destacam a importância de intervenções e estímulos para a construção das condutas aprendidas. Algumas técnicas são usadas como estratégias de aprendizagem. Uma dessas técnicas é a 'aprendizagem operante', descrita nas décadas de 1950 e 1960, pelo cientista do comportamento B. F. Skinner. Fundamentalmente, o comportamento aprendido é consolidado por reforçadores, ou seja, estímulos que irão interferir na frequência de repetição de um comportamento. Se um estímulo, como um produto que satisfaça os desejos e necessidades do consumidor, gera o aumento da intenção de compra, esse estímulo é um reforçador positivo (PINHEIRO et al., 2015).

2.2.1.3 Motivação

A motivação é o impulso ou motivo que leva o indivíduo a agir de determinada maneira em relação a um objeto (KOTLER, 2000; MOWEN; MINOR, 2003; PINHEIRO et al., 2015). A motivação ocorre, geralmente, para satisfazer uma necessidade, a fim de reduzir uma tensão que resulta de uma necessidade não satisfeita (PINHEIRO et al, 2015; SCHIFFMAN; KANUK, 2000).

Kotler e Keller (2006), na administração de *marketing*, consideram três teorias da motivação: teoria da motivação de Freud, teoria da motivação de Maslow e teoria da motivação de Herzberg. Freud considerou que o comportamento das pessoas é moldado por forças psicológicas inconscientes. Para Maslow, as necessidades humanas são organizadas hierarquicamente de modo que as necessidades mais urgentes antecedem as menos urgentes. Herzberg desenvolveu a teoria dos fatores que causam insatisfação, chamado de insatisfatório, e dos fatores que causam satisfação, conhecidos por fatores satisfatórios.

De acordo com Kotler (2000), a teoria de Freud para a motivação humana, diz que as motivações que formam o comportamento humano são inconscientes e que um indivíduo não entende completamente suas motivações. Nesse sentido, Pinheiro et al. (2015) evidenciam a importância dos estímulos do *marketing* para despertar as necessidades dos consumidores, bem como orientá-los de modo a satisfazer tais necessidades.

2.2.1.4 Atitude

Aaker, Myers e Batra (1992), afirmam que a atitude relativa a um produto ou marca tem fundamental importância para as grandes corporações,

pois é o cerne das vendas e dos lucros. As atitudes dizem respeito às crenças e sentimentos acerca de um objeto, de modo a prever o comportamento do consumidor acerca desse objeto (FISHBEIN; AJZEN, 1975).

Atitude é uma avaliação duradoura das pessoas, sobre elas mesmas e sobre suas percepções em geral, de modo a prever uma ação coerente sobre objetos e ambientes que as cercam (RODRIGUES, ASSMAR; JABLONSKI, 2003; SOLOMON, 2011).

Por meio do conhecimento das atitudes, pode-se realizar inferências sobre o comportamento e estimar a intenção do comportamento (RODRIGUES, 1976). Em resumo, nota-se que determinada opinião a respeito de um objeto acarreta a formação de uma atitude que gera intenções em relação ao comportamento sobre o objeto (CHAN, 2001; FISHBEIN; AJZEN, 1975; PEREIRA; AYROSA, 2004).

2.2.2 Intenção de compra

Entender o comportamento de compra dos consumidores é um grande desafio, uma vez que ele é, na maioria das vezes, irracional e imprevisível (HARTLINE; FERRELL, 1996). Uma das formas de se prever o comportamento do consumidor é por meio da intenção de compra, ou seja, investigar o que o consumidor tem a intenção de fazer (BLACKWELL; MINIARD; ENGEL, 2008). Segundo Gilson e Berkmam (1979), quanto maior a intenção, maior é a probabilidade do comportamento de compra se concretizar.

A intenção de compra expressa a preferência do consumidor por um produto ou serviço, uma vez que esse consumidor acredita necessitar desse produto ou serviço (MADAHI; SUKATI, 2012).

Para Magalhães e Damacena (2006), a intenção de compra é definida por um conjunto de fatores que levam o consumidor a se comportar de uma determinada maneira, sobre um produto ou serviço específico.

Entender e mensurar a intenção de compra são práticas frequentemente exploradas em experimentos acadêmicos (ABRANTES; AVILA; FARIA, 2010) e também no âmbito gerencial, a fim de elevar as vendas e maximizar os lucros, e também para identificar nichos e potencialidades para os produtos (WHITLAR; GEURTS; SWENSON, 1993).

A fim de se obter uma maior intenção de compra, técnicas são usadas para obter informações a respeito das necessidades e desejos dos consumidores, tais como a intervenção educativa e a análise conjunta de fatores.

2.3 Intervenção educativa

A intervenção educativa descreve um conjunto de atos e discursos de ensino, com a finalidade de alcançar os objetivos educativos socialmente determinados (COUTURIER, 2006; LENOIR et al., 2002; NÉLISSE; ZÚÑIGA, 1997). Intervir é agir de modo a modificar ou inserir um conhecimento (LENOIR et al., 2002).

A intervenção educativa pode ser realizada usando a aprendizagem 'passiva' ou 'ativa'. A aprendizagem passiva envolve a aquisição de conhecimento por meio do ensino didático, caracterizado pela ausência de resistência ao que é aprendido (HAIDET et al., 2004; KRUGMAN; HARTLEY, 1970). Por exemplo, os alunos podem obter informações lendo materiais educacionais. Em contraste com a aprendizagem passiva, a aprendizagem ativa enfatiza a comunicação dinâmica entre os alunos em relação a um assunto a ser aprendido. Os participantes envolvidos no modo de aprendizagem ativa estão mais acostumados a envolver-se com materiais educacionais e uns com os

outros, do que aqueles que funcionam no modo de aprendizagem passiva (HAIDET et al., 2004). No entanto, alguns alunos descobriram que são mais capazes de fazer uso apropriado do conhecimento adquirido por meio da aprendizagem passiva, do que por meio da aprendizagem ativa, mesmo que ambos os modos possam ser eficazes para melhorar seu conhecimento (HAIDET et al., 2004).

Alguns estudos usaram panfletos ou folhetos informativos para fornecer informações sobre os rótulos, para testar se a intervenção passiva é eficaz (HOOGLAND; DE BOER; BOERSEMA, 2007, LUSK et al., 2004, VAN WEZEMAEL et al., 2012). Esses pesquisadores compararam o conhecimento dos participantes sobre as reivindicações do rótulo e sua disposição de pagar antes e depois de terem recebido informações sobre os rótulos, por meio de um folheto. Alternativamente, a intervenção de aprendizagem passiva pode ser conseguida por meio da televisão, internet, comunicação pessoal e ensino. Na verdade, a popularidade de tais métodos tem continuado a crescer.

Alguns estudos apontam que a aprendizagem ativa é menos eficiente que a aprendizagem passiva, principalmente a aprendizagem passiva com efeito de autoridade. Isso porque muitos consumidores consideram os médicos e institutos de pesquisa como as fontes de informação mais confiáveis em relação aos perigos relacionados com os alimentos (LIU; PIENIAK; VERBEKE, 2014). Em outras palavras, quando as informações sobre as reivindicações de rótulos são apresentadas por figuras autênticas confiáveis, ou institutos, os consumidores estão inclinados a confiar mais no efeito autoritário em comparação a informação fornecida por um panfleto. A intervenção ativa de aprendizagem também tem sido utilizada por meio de discussão de grupos, concebidas para educar os participantes do painel sobre as reivindicações do rótulo dos produtos alimentares ou novas técnicas de preservação (HAUGAARD et al., 2014).

Geralmente os estudos com intervenção educativa são realizados em etapas, onde a intervenção é aplicada a um ou mais grupos e em diferentes momentos. Questionários são usados para medir as diferenças entre as intervenções e nos diferentes momentos. A eficiência da técnica é medida e, posteriormente, analisada por análises estatísticas pertinentes, como a Anova para medidas repetidas (RM-Anova), como descrito nos estudos realizados por Samant, Crandall e Seo (2016) e Samant e Seo (2016a,b).

A intervenção educativa pode ser aplicada aos consumidores para conscientizá-los a respeito dos malefícios do consumo exagerado de sódio, por meio de meios de comunicação de massa como a televisão, por exemplo.

A mera ausência de resistência, em vez da presença de motivação e envolvimento intencional, é tudo o que é necessário para o aprendizado ocorrer. Esta forma de aprendizagem pode ser considerada passiva, na medida em que nem a motivação nem o interesse são um pré-requisito para a obtenção do conhecimento (KRUGMAN; HARTLEY, 1970).

A intervenção educativa foi utilizada por Samant, Crandall e Seo (2016) para comparar a eficiência da intervenção educacional na melhoria da qualidade de vida dos consumidores, compreensão e atitude em relação a sustentabilidade e às reivindicações relacionadas ao rótulo de produtos de frango. Os mesmos pesquisadores estudaram se variação dos impactos dos rótulos sobre a percepção de qualidade e a aceitabilidade da carne de peito de frango diferem segundo o nível de entendimento dos consumidores por meio da intervenção educativa. Em outro estudo, verificaram o efeito da intervenção educativa do rótulo sobre o comportamento de compra dos consumidores, medido em relação à sua atenção visual para as reivindicações de rótulo em produtos de frango (SAMANT; SEO, 2016 a, b).

2.4 Análise conjunta de fatores

A análise conjunta de fatores (ANCF) é uma metodologia muito utilizada para obter informações sobre o efeito de diferentes atributos do produto sobre o gosto e/ou intenção de compra de produtos alimentícios (GREEN; SRINIVASAN, 1978). A ANCF é uma das ferramentas mais importante no auxílio do desenvolvimento de produtos e tomada de decisão na área de *marketing* (NATTER; FEURSTEIN, 2002). De maneira simplificada, a ANCF é a avaliação da combinação de elementos do produto pelos respondentes, com o objetivo de entender como esses elementos ou componentes das combinações influenciam a resposta dos julgadores (MOSKOWITZ et al., 2004).

A ANCF é uma análise de regressão linear múltipla utilizada para investigar a influência que duas ou mais variáveis independentes exercem sobre uma variável dependente (preferência ou intenção de compra, por exemplo) (GREEN; RAO, 1971). A análise baseia-se na premissa de que os consumidores avaliam o valor ou utilidade do produto ou serviço, pela combinação da contribuição de cada um dos fatores que o compõem (CARNEIRO et al., 2010). Dessa forma, por meio de modelos ajustados aos dados obtidos em estudos planejados com este propósito, estima-se a contribuição de fatores e seus níveis preestabelecidos na construção da preferência do consumidor, por diferentes versões de uma embalagem, produto ou serviço.

A ANCF também pode ser definida como uma técnica estatística por meio da qual as preferências e intenção de compra dos consumidores por diferentes produtos são decompostas, para determinar a contribuição ou importância relativa atribuída, pelos mesmos, a cada um dos níveis dos fatores (KOTLER, 2000). Dessa forma, dentre outras aplicações, é possível estudar as preferências e a intenção de compra dos consumidores por produtos e serviços,

definir alterações e melhorias nos mesmos e desenvolver novos produtos (CARNEIRO et al., 2010).

Segundo Della Lucia (2008) e Carneiro et al. (2010), para a aplicação da ANCF é necessário realizar várias etapas, tais como a escolha dos fatores e níveis da embalagem, escolha da regra de composição ou modelo para análise, seleção do método de coleta de dados, definição do planejamento experimental, avaliação dos tratamentos, análise dos dados e interpretação dos resultados.

a) Escolha dos fatores e níveis - Deve-se escolher apenas os fatores e níveis que pressupõe-se que irão interferir na atitude dos consumidores, pois um número grande de fatores pode dificultar a avaliação do consumidor e prejudicar a credibilidade dos resultados. A técnica de grupos de foco é muito útil para a seleção dos fatores e níveis (CARNEIRO et al., 2010; DELLA LUCIA et al., 2008).

b) Escolha do método de coleta de dados **-** as principais metodologias de coleta de dados na ANCF são os métodos *trade-off* e o perfil completo. No método *trade-off,* cada tratamento é constituído da combinação de níveis de apenas dois fatores; assim, compara-se dois fatores por vez. O consumidor avalia todos os tratamentos de uma só vez, ordenando-os de acordo com sua preferência. No método perfil completo, cada tratamento é formado pela combinação de todos os fatores, sendo, dessa forma, constituído de um nível de cada fator. Um número de fatores muito grande pode dificultar a análise, devido a sobrecarga de informações (CARNEIRO et al., 2010; DELLA LUCIA et al., 2008).

c) Definição do planejamento experimental - determinados os fatores e os níveis, deve-se definir os tratamentos que irão ser estudados por meio de um arranjo fatorial. Definido os tratamentos, escolhe-se o delineamento experimental a ser utilizado, incluindo a definição da ordem de apresentação dos tratamentos e do número de consumidores. Pode-se

adotar o planejamento fatorial completo, quando o número de fatores e níveis é pequeno, ou para um grande número de tratamentos a serem analisados, utiliza-se o planejamento fatorial fracionado (CARNEIRO et al., 2010; DELLA LUCIA et al., 2008).

d) Avaliação dos tratamentos - os tratamentos são avaliados pelos consumidores de forma global quanto à preferência, aceitação ou intenção de compra, sendo apresentados na forma de protótipos, fotos, cartões com informações ou *slides*. As avaliações são realizadas por meio de fichas com escalas (CARNEIRO et al., 2010; DELLA LUCIA et al., 2008).

e) Seleção da regra de composição ou modelo para análise **-** Os dados coletados com a avaliação dos consumidores são analisados seguindo uma regra de composição que determina a forma de combinação entre os fatores para que os mesmos expliquem a preferência do consumidor. A regra de composição mais utilizada é o modelo aditivo ou de efeitos principais, no qual as contribuições dos níveis dos fatores são somadas para se obter o valor da preferência do consumidor pelo tratamento. Neste modelo, apenas as contribuições dos fatores e seus níveis são estimados, não incluindo os efeitos das interações entre os fatores (CARNEIRO et al., 2010; DELLA LUCIA et al., 2008).

f) Análise dos dados - Segundo Della Lucia (2008) e Carneiro et al. (2010) existem quatro maneiras de analisar os dados: análise individual, análise agregada, análise por segmentos (*clustering segmentation*) e análise *componential segmentation*. Na análise individual, as contribuições de cada nível de cada fator (coeficientes de preferência - CP's) são estimadas para cada consumidor, ou seja, para cada consumidor é estimada uma função para predizer sua preferência, aceitação ou intenção de compra. Para a análise agregada, um único modelo é

ajustado para todos os consumidores. Dessa forma, os CP's do modelo agregado correspondem às médias dos CP's estimados no modelo individual. Na análise por segmentos, primeiramente, calcula-se os CP's individuais dos consumidores; em seguida, agrupa-se os consumidores que apresentaram valores de CP's semelhantes, ou seja, demonstraram comportamento parecido. Posteriormente, realiza-se a análise agregada, determinando os CP's de cada nível, de cada fator, em um mesmo segmento (grupo). Para a análise *componential segmentation* - estuda-se a interação entre o perfil do produto e os dos consumidores em relação a sua avaliação, predizendo como um consumidor com determinado perfil avalia um produto.

g) Interpretação dos resultados - para interpretar os resultados analisa-se a contribuição de cada nível de cada fator (representada pelos valores de CP's) e a importância relativa dos fatores na intenção de compra ou preferência ou aceitação dos consumidores (CARNEIRO et al., 2010; DELLA LUCIA et al., 2008).

A análise conjunta de fatores é muito utilizada em estudos na área de produtos alimentícios (ARES; GAMBARO, 2007; BECH-LARSEN; GRUNERT, 2003; CARDELLO; SCHUTZ; LESHER, 2007; COX; EVANS; LEASE, 2008; GARCÍA-TORRES; LÓPEZ-GAJARDO; MESÍAS, 2016; HAILU et al., 2009;; MOSKOWITZ; BECKLEY; MINKUS-MCKENNA, 2004).

A análise conjunta foi usada por García-Torres; López-Gajardo e Mesías (2016) para avaliar as preferências dos consumidores pela carne orgânica de dois sistemas de produção permitidos pela regulamentação da UE: i) livre no campo e, ii) intensivo (engordado com ração com alimentos biológicos) em comparação com a carne de bovino produzida convencionalmente.

Della Lucia et al. (2007) avaliaram o efeito de fatores da embalagem de café orgânico na intenção de compra de consumidores por meio da análise conjunta. Os fatores avaliados foram preço, cor da embalagem, marca e informação geral sobre produtos orgânicos.

Carneiro et al. (2005) avaliaram o efeito de alguns atributos do rótulo de óleo de soja sobre a intenção de compra do consumidor, por meio de análise conjunta e concluíram que a intenção de compra foi afetada pelo preço, ou seja, os óleos de preço mais baixo têm maior intenção de compra.

3 CONSIDERAÇÕES FINAIS

Concluiu-se nesse estudo, que a intervenção educativa desempenha um papel eficaz na melhoria da compreensão dos consumidores em relação aos danos causados pela ingestão excessiva de sódio, e o potencial comportamento dos consumidores. O uso de informações impactantes, como a taxa de mortalidade associada a doenças cardiovasculares, e os montantes gastos com o tratamento destas doenças, é um instrumento importante para influenciar os consumidores a mudarem o seu comportamento.

As intervenções educativas (aprendizagem ativa, aprendizagem passiva e aprendizagem passiva com um efeito autoritário) foram igualmente eficientes para a compreensão das questões objetivas sobre sódio e rótulo pelos participantes. Para questões subjetivas, que se referem ao comportamento dos participantes e a intenção de comprar, a intervenção educativa aprendizagem passiva (leitura de um panfleto sem interferência de outros participantes) foi ligeiramente melhor do que os outros. A abordagem agressiva mostrou-se mais eficiente em comparação à abordagem branda, como a técnica de abordagem para a intervenção educativa. Ou seja, ensinamentos mais profundos e mais chocantes têm um melhor resultado de aprendizagem.

A análise conjunta mostrou que a compra foi intencionalmente afetada pelas reivindicações, tipo de produto e cor do rótulo. Os grupos com maior importância relativa para as reivindicações foram os grupos formados por homens sedentários, homens e sedentários (homens e mulheres). A alegação 'light', produto 'queijo parmesão' e a cor 'vermelho', teve um impacto menor sobre a intenção de compra para todos os grupos avaliados. Para o fator produto, o que apresentou maior impacto positivo foi o queijo frescal, com exceção do grupo de mulheres sedentárias que avaliaram negativamente este produto. O produto de calabresa teve a maior influência sobre a intenção de comprar,

apenas para os grupos de consumidores compostos por mulheres sedentárias e o grupo sedentários (homens e mulheres). A influência mais positiva foi '25% menos sódio' para todos os grupos, e para a cor, a mais influente foi o azul. A cor verde só teve impacto negativo para os grupos de mulheres sedentárias consumidoras e o grupo sedentário (homens e mulheres). Este estudo pode servir como uma base para que as empresas de alimentos introduzam no mercado, produtos com reduzido teor de sódio, rotulados de forma a satisfazer as necessidades e desejos dos consumidores. Além disso, por meio das informações desse trabalho, as empresas podem reformular suas embalagens, a fim de aumentar a intenção de compra de produtos com baixo teor de sódio.

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SEGUNDA PARTE – ARTIGOS

ARTIGO 1: THE IMPACT OF VARYING EDUCATIONAL INTERVENTION ON CONSUMERS' UNDERSTANDING AND ATTITUDE TOWARD REDUCING SODIUM IN FOOD: IMPLICATIONS FOR MARKETING STRATEGIES

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ABSTRACT

Awareness of the harm caused by excessive sodium intake can be a precious tool to reduce your consumption. And one way is through educational intervention. The objective of this study was to compare the effectiveness of different forms of educational intervention (active learning, passive learning, and passive learning with an authoritative effect) and the way it is presented (soft or aggressive), to improve the knowledge of consumers regarding to sodium and also to sodium-reduced product labels. Three different educational interventions, active learning (AL), passive learning (PL), and passive learning with an authoritative effect (PA), were used to provide information about sodium chloride, its importance in the body and the label of the product with reduced sodium content. Each intervention had a soft and aggressive approach totalizing six interventions. The research questionnaire was designed to determine the effect of different educational approaches. This questionnaire was applied to the participants before, after and two weeks after the educational intervention. The educational interventions were equally efficient for the participants' understanding of the questions about sodium and label. For questions which refer to participants' behavior and intention to buy, the educational intervention passive learning was slightly ($p \leq 0.05$) better than the others. The aggressive approach proved to be more efficient compared to the soft approach as the approach technique for educational intervention. Educational intervention plays an effective role in improving consumers' understanding of the harm caused by excessive sodium intake and potentially changing consumer behavior.

Keywords: label, soft approach, aggressive approach, active learning, passive learning, authoritative effect

1. INTRODUCTION

Sodium is an essential nutrient for the proper functioning of the body. It is mainly consumed in the form of sodium chloride (NaCl). An adequate intake of sodium contributes to the acid-base balance, pressure regulation, intracellular water transport, regulation of osmotic pressure, transmission of nerve impulses, and muscle contraction (KAPLAN, 2000; VIEGAS, 2009; CRUZ et al., 2011; FREIRE et al., 2015).

However, recent dietary changes to a high NaCl intake present a major challenge to physiological systems to excrete these large amounts of NaCl through the kidneys (HE and MACGREGOR, 2010). It has been found that excessive dietary intake of NaCl causes hypertension, cardiovascular disease, renal disease, etc. (HE and MACGREGOR, 2009; TUOMILEHTO et al, 2001). Medical evidence indicates that reducing sodium intake lowers the blood pressure and decreases the incidence of diseases related to blood pressure (HE and MACGREGOR, 2010; YAMAGUCHI and NINOMIYA, 2000). Therefore, reducing sodium intake has been highly recommended, and various programs have been introduced in different countries to achieve gradual and sustained reductions in the amount of NaCl added to foods. Although there is a maximum daily recommendation of 5g of NaCl established by the WHO (2007), several industrialized products far exceed this value per portion of the product.

Excessive sodium intake may be linked to a lack of consumer awareness. It is estimated that most consumers do not have in-depth knowledge about sodium and what problems the excessive consumption of sodium can cause. On the other hand, little is the knowledge that companies and governments have about consumer behavior and how this consumer understands the subject sodium. One of the ways to reduce sodium intake is through consumer awareness. In order to make consumers aware, it is necessary to know

the consumer from a psychological perspective, that is, to understand the aspects of information processing. Educational intervention is a way to get consumers to know about sodium in food and how sodium should be expressed on food labels. In addition, educational intervention may modify consumers' excessive consumption of sodium. The information obtained in the educational intervention makes it possible, among other things, to develop a plan of media capable of reaching consumers and making them modify the habit of consuming sodium.

Through the educational intervention the consumer can be made aware of the harmful effects of excess sodium consumption and also, to educate them to identify the presence of sodium through the labels of processed foods. Since the label is often the largest form of nutritional information used by consumers (CAMPOS et al., 2011). Educational response to label claims and sodium information may be performed using either " passive " or " active " learning. Passive learning involves knowledge acquisition via didactic teaching characterized by absence of resistance to what is learned (HAIDET et al., 2004; KRUGMAN and HARTLEY, 1970). For example, learners can obtain information by reading educational materials. In contrast to passive learning, active learning emphasizes dynamic communication among learners with respect to a subject to be learned. Participants in the active learning mode are more accustomed to engaging with educational materials and with each other than those functioning in the passive learning mode (HAIDET et al., 2004). However, some learners have found that they are more able to make appropriate use of knowledge gained through passive learning than through active learning even though both modes can be effective in improving learners' knowledge (HAIDET et al., 2004).

Little research has directly compared passive and active learning methods with respect to the efficiency of improving consumers' knowledge or

attitude toward food labels. Most studies have focused on either passive or active-learning intervention. Some studies have used flyers or information sheets to provide information on the labels to test whether passive-learning intervention is effective (HOOGLAND et al., 2007; LUSK et al., 2004; VAN WEZEMAEL et al., 2012). These researchers compared participants' knowledge of the label claims and their willingness to pay both before and after they were provided with information about the label claims through a flyer. Alternatively, passive-learning intervention can be achieved through television, internet, personal communication, and teaching; indeed, the popularity of such methods has continued to grow. Notably, consumers have been found to consider medical doctors and research institutes as the most trustworthy sources of information with respect to food-related hazards (LIU; PIENIAK; VERBEKE, 2014). In other words, when information regarding label claims is presented by authentic trusted figures or institutes, consumers are inclined to rely more on the authoritative effect as compared to when the information is provided by a flyer. Active learning intervention has also been used through focus-group discussions designed to educate panel participants regarding food product label claims or new preservation techniques (HAUGAARD et al., 2014). Educational intervention may have a soft or aggressive approach. One differs from the other by the way information is presented, and the aggressive form is a more powerful way of presenting the information.

This study aims to determine if the type of information provided and the way it is transmitted, comparing educational interventions, affects consumers' understanding and attitude towards consumption of sodium and sodium-reduced products as well as the label of these products; generating information for marketing strategies. More specifically, the objective of this study is to compare the effectiveness of different forms of educational intervention (active learning, passive learning, and passive learning with an authoritative effect) and the way it

is presented (soft or aggressive), to improve the knowledge of consumers regarding to sodium and also to sodium-reduced product labels; As well as to assess the behavioral change of these participants throughout the intervention sessions and the type of intervention submitted.

2. MATERIAL AND METHODS

The present study was approved by the Ethics Committee under number 57537716.1.0000.5148. Prior to participation, all participants received an explanation of the experiment and each participant signed a free and informed consent form.

The methodology used was adapted from the one proposed by Samant al. (2016).

2.1. Recruitment and characterization of participants

Volunteers (N = 180) were randomly assigned to one of six education groups (30 volunteers per group); however, only 144 participants completed this study: active learning group with a soft approach (N = 26); active learning group with an aggressive approach (N = 24); passive learning group with a soft approach (N = 23), passive learning group with aggressive approach (N = 23), passive learning group with authority effect and soft approach (N = 26), and passive learning group with authority effect and aggressive approach (N = 22). Graduating students from the 6th and 7th grades were recruited as volunteers. To minimize the potential effect of variation in background knowledge, only those with no prior academic courses related to food science, food engineering, or nutrition were invited.

A demographic questionnaire was presented to the participants in the pre-intervention session to assess the homogeneity of the groups regarding gender, mean age, marital status, monthly income level and schooling level.

In order to characterize the participants in the pre-intervention session, six questions were presented to know the opinion and behavior of the volunteers regarding sodium content in food (Appendix A). The issues were related to the sodium content of industrialized foods were addressed; Availability of products with sodium reduction in the market; And labeling of processed products with sodium reduction, on a unstructured 5-point Likert scale ranging from 5 (Completely Agree) to 1 (Completely Disagree). Also presented were two questions about the relevance of the presence and / or quantity of sodium for the purchase, on a 5-point Likert scale ranging from 5 (Totally important) to 1 (No importance).

2.2. Elaboration of the label

In this study, the focus group was used to define the most important attributes related to the labeling of products with sodium reduction. It also aimed to define which products deserve priority in sodium reduction, to define the best and least appropriate terms to express a product with sodium reduction; Set the best color for the sodium-reduced product label, and set the best and worst claims for expressing a reduced sodium product. Therefore, four focus group sessions were conducted according to a description methodology in Della Lucia and Minim (2006).

Through four focus group sessions, where there were 6 to 10 participants in each group (between 20 and 60 years of age). It was defined that the claim "light" is the most complex term. The blue color is best suited for the label of products with sodium reduction. In addition, it was determined that the image of

the product to be used on the label would be that of a pepperoni. The traditional pepperoni was pointed out by participants from the focus group as being a product with high sodium content.

The label used in the survey was the same for all interventions (Appendix C). Based on existing commercial product labels, information acquired in focus groups and in accordance with Brazilian food labeling standards, the experimental label was created using the Corel Draw® program (version 11.0). The images were printed using a color laser printer on A4 office paper.

2.3. Application of educational interventions

Three different educational interventions, active learning (AL), passive learning (PL), and passive learning with an authoritative effect (PA), were used to provide information about sodium chloride, its importance in the human organism and the label of the product with reduced sodium content. Each intervention had a soft and aggressive approach. Volunteers were invited to learn about sodium and food labels processed with sodium reduction through one of the six actions described below.

(a) Active learning (AL): Participants were invited to freely discuss the label and the flyer with other participants for 20 min.

(b) Passive learning (PL): Participants were asked to read information on the label and the flyer for 20 min. Questions and discussions were not allowed.

(c) Passive learning with authority effect (PA): Participants were invited to attend a lecture for 15 min and then read instructions on the information contained in the label through a flyer for 5 min; Questions and discussion were not allowed. In the lecture the information described on the flyer was explained.

The educational approaches were through active learning (discussing the label and the flyer with other participants), passive learning (reading a flyer and label alone) and passive learning with an authoritative effect (attending a lecture about the label and flyer), and were conducted as described by Samant et al. (2016). Each approach was conducted in a soft or aggressive approach. The aggressive form differs from the moderate form because there is more explanation in the flyer for this intervention about the impact of excessive sodium intake, citing the possible diseases generated. The relationship between excessive sodium intake and disease development was also addressed aggressively through secondary data from the Ministry of Health.

For the research were developed two types of flyers, one with a soft approach (Appendix D) and another with an aggressive approach (Appendix E). The two types of flyers began with a description of sodium chloride and its importance in the body. Both flyers also present information about the labeling of products with sodium reduction and the meaning of the terms 'Reduced sodium content', 'Light', 'Less 25% sodium' and 'Less sodium content'. Still on the labeling, the two flyers present information about the way sodium is expressed. There is also information on the maximum daily value of NaCl consumption recommended by the World Health Organization (WHO). What differentiates the two flyers is that in the soft approach, there is a catch phrase: "To have a healthier life, consume more fruit, less sodium, and exercise regularly." Already in the flyer with aggressive approach, shocking information was added, such as: "Consumption of sodium above the recommended maximum impairs the full functioning of the body, since the arteries (responsible for irrigation of various organs) are damaged, paving the way for a series of complications such as stroke, blindness, renal insufficiency, cardiovascular complications, among others.", "Cardiovascular diseases account for 1.2 million deaths a year in the country.", "300,000 Brazilians are victims of

acute myocardial infarction per year.", "Cardiovascular diseases are the leading cause of death in Brazil.", and "Hypertension affects more than 30 million people in Brazil: this disease can be caused by obesity, alcohol consumption, stress, high salt intake (NaCl), low physical activity and inadequate sleep.". The objective of the aggressive approach was to impact the participant with truthful information. Similar method was described by O'Hegarty et al. (2006), when studying reactions of young adult smokers to warning labels on cigarette packages.

The study was conducted in three sessions: pre-intervention, before, and two weeks after the intervention, in two different days. On the first day, each participant was asked to complete the socioeconomic questionnaire, as described in item 2.1, and a research questionnaire to evaluate their initial knowledge about the information about sodium reduction in food. Then each group of volunteers received one of six types of educational intervention. Through a lottery, it was defined which group would perform what intervention. Immediately after the educational intervention, each participant was invited to fill out a answered evaluation questionnaire. The order of options for each question was changed at random. To determine the retention of knowledge regarding the topic of sodium reduction in foods, all participants answered the evaluation questionnaire again two weeks after the educational intervention session. The order of options for each question was changed randomly again. Additional questions were introduced in the evaluation questionnaire to be answered after the educational intervention to measure the efficiency of educational intervention in the perception and behavior of volunteers (SAMANT et al., 2016).

2.4. Effects of educational intervention on participants' understanding and participants' perception

A research questionnaire of 8 questions was designed to determine the effect of different educational approaches on the opinion and behavior of volunteers on sodium in food (Appendix B). This research questionnaire was applied to the participants in three sessions: pre-intervention, after and two weeks after the educational intervention. Three questions are about the label of products with sodium reduction; And 5 on the effect of sodium on the body and the impact of excessive sodium consumption on health.

For a better understanding, the questions of the evaluation questionnaires were grouped into objective questions and subjective questions. The meaning of the terms "reduced sodium content", "lower sodium" and "light" is the meaning of the terms "label".

2.4.1. Objective and subjective understanding

The objective questions about sodium were "Sodium intake can cause cardiovascular disease.", "The recommended daily maximum NaCl consumption is 5g.", "It is mandatory to contain sodium content in food labels.", "O Excessive consumption of sodium contributes to the occurrence of stroke.", and "The main cause of death in Brazil is cardiovascular disease." on a unstructured 5-point Likert scale ranging from 1 (Completely Disagree) to 5 (Completely Agree).

2.4.2 Purchase and pay intention

Three subjective questions were presented to know the participants' intention to buy. Participants were asked if they would buy a sodium-reduced

product and how much they were willing to pay extra for that product on unstructured 5-point Likert scale ranging from 1 (certainly would not buy) to 5 (would definitely buy) and on unstructured 7-point Likert scale ranging from 1 (would not pay anything more) to 7 (would pay 100% more), respectively. The importance of label information for the purchase was also questioned.

2.5 Participants' perception of sodium reduction products

To evaluate participants' perception of sodium-reduced products, three questions were addressed. One question asked whether participants believed that the consumption of sodium-reduced products brings health benefits. The other questions were to find out the opinion of the participants in believing that the consumption of sodium-reduced products contributes to renal insufficiency or contributes to the reduction of disease risk. In this question a scale of 1 was used for "yes" and 0 for "no".

2.6 Efficiency of the educational intervention

Three questions were added to the research questionnaire, in the session two weeks after the educational intervention, to measure the efficiency of educational intervention in the perception and behavior of volunteers. The questions were: "Do you agree that educational interventions such as advertisements (radio, television, internet, and packaging) would be an effective way to educate consumers about excessive sodium intake?" And "Educational intervention contributed to the change in their consumption habits in relation to sodium reduction") on a 5-point Likert scale ranging from 1 (Completely Disagree) to 5 (Completely Agree).

2.7 Data analysis

The data from the sociodemographic questionnaire were analyzed by cross-frequency, chi-square test and average test.

To determine if the participants' knowledge about sodium in the diet and also about the labels of products with sodium reduction vary from the type of educational intervention a repeated measures analysis of variance (RM-ANOVA) was performed. The research session (before, after and two weeks after the educational intervention) was considered as a factor within the participant and type of education (AL S, AL A, PL S, PL A, PA S and PA A) as a factor between-participants. The degrees of freedom were adjusted by using ''Greenhouse–Geisser'' correction when a sphericity assumption was violated through Mauchly's sphericity test. If RM-ANOVA indicates a significant difference in means, post hoc comparisons between independent variables were performed using Bonferroni t-tests, as described by Samant, Crandall, & Seo, (2016). A partial eta squared (gp2) value was used to measure an effect size. The partial eta squared values of 0.01, 0.06, and 0.14 are considered small, medium, and large effect-sizes, respectively (KITTLER; MENARD; PHILLIPS, 2007).

The graph for the objective comprehension of the label was elaborated with the means of the scores for the correct ones (1 for correct) and the graph for the objective understanding about the sodium was elaborated with the averages of the scores of the question (1 for completely disagree and 5 for Completely agree).

Objective understanding of the label was measured by counting the number of correct answers the 3 questions (1 question per claims) with score 1 for correct and 0 for incorrect. The "subjective" term refers to issues that vary with the opinion of each consumer.

Data was analyzed using SPSS 21.0 for Windows TM (IBM SPSS Inc., Chicago, IL, USA) and Microsoft Excel 2007.

3. RESULTS

3.1 Demographic characterization of the participants in the pre-intervention session

Table 1 shows demographic profiles of the six groups. The demographic profiles of the six groups did not differ in terms of mean age, marital status, monthly income level and schooling level ($p > 0.05$) by the Anova. There was a slight significant difference ($p < 0.05$) in relation to gender by the anova. Potential influences of demographic profiles on understanding and attitudes toward the label were minimized since the six groups did not differ, except gender, in terms of their demographic profiles (CANNOOSAMY et al., 2014).

Table 1. Demographic profiles of the six educational-intervention groups.

	Type of educational intervention[1]											
	AL (group discussion)				PL (flyer)				PA (lecture)			
	Soft approach		Aggressive approach		Soft approach		Aggressive approach		Soft approach		Aggressive approach	
	N	%	N	%	N	%	N	%	N	%	N	%
Number of participants	26		24		23		23		26		22	
Gender												
Men	18	69.2	16	66.7	20	87.0	13	47.8	10	38.5	14	63.6
Women	8	30.8	8	33.3	3	13.0	11	52.2	16	61.5	8	36.4
Mean age (±standard deviation)	23 (± 2) years		23 (± 4) years		23 (± 3) years		23 (± 1) years		23 (± 4) years		23 (± 2) years	
Marital status												
Single	24	92.3	23	95.8	23	100.0	22	95.7	22	84.6	22	100.0
Married	1	3.8	1	0.2	0	0.0	1	4.3	3	11.5	0	0.0
Living with	1	3.8	0	0.0	0	0.0	0	0.0	1	3.8	0	0.0
Monthly household income level												
Less than R$1,000	2	7.7	2	8.3	0	0.0	3	13.0	3	11.5	4	18.2
R$1,000 to R$3,999	14	53.8	16	66.7	16	65.2	15	65.2	13	50.0	7	31.8
R$4,000 to R$6,999	7	23.9	2	8.3	6	26.1	2	8.7	7	26.9	6	27.3
R$7,000 to R$9,999	2	7.7	2	8.3	1	4.3	2	8.7	1	3.8	4	18.2
Above than R$10,000	1	3.8	2	8.3	1	4.3	1	4.3	2	7.7	1	4.5
Education level												
Incomplete college	24	92.3	22	91.7	23	100.0	23	100.0	25	96.2	21	95.5
College degree	1	3.8	1	4.2	0	0.0	0	0.0	1	3.8	0	0.0
Master or Ph.D.	1	3.8	1	4.2	0	0.0	0	0.0	0	0.0	1	0.5

[1] AL: active learning, PL: passive learning, PA: passive learning with an authoritative effect.

3.1.1 Opinion of the participants regarding sodium content in food in the pre-intervention session

Opinion of the participants regarding sodium content in relation to the six educational interventions in the pre-intervention session (before), according to table 2.

Table 2. Comparisons of the six groups of educational interventions with regard to the opinion of the participants on the sodium content in foods.

	Type of educational intervention[1]					
	AL (group discussion)		PL (flyer)		PA (lecture)	
	S[2]	A	S	A	Soft	A
The sodium content in processed foods is high	4.83 [ab] (±0.81)	3.96 [a] (±0.91)	4.35 [ab] (±0.83)	4.83 [b] (±0.39)	4.50 [ab] (±0.71)	4.64 [b] (±0.66)
There are few industrialized products with sodium reduction on the market.	4.00 (±0.95)	4.00 (±0.83)	3.83 (±0.58)	4.00 (±1.00)	4.23 (±0.99)	3.45 (±1.30)
Dairy products with salty taste (butter, cheese, etc.) have a sodium content above ideal	3.70 (±0.84)	3.29 (±1.12)	3.29 (±0.94)	3.70 (±0.76)	4.12 (±0.86)	3.82 (±0.73)
Foods processed with sweet taste (soft drinks, filled biscuits, etc.) have high sodium content	4.26 (±0.80)	3.96 (±1.00)	3.96 (±0.88)	4.26 (±0.86)	4.12 (±0.82)	4.27 (±0.70)
The nutritional information table is an important way to consult the amount of sodium present in processed foods	4.83 (±0.95)	4.58 (±0.78)	4.43 (±0.73)	4.83 (±0.49)	4.50 (±0.81)	4.59 (±0.67)
The list of ingredients is an important way to consult the amount of sodium present in processed foods	4.30 (±1.39)	4.17 (±1.05)	3.87 (±1.25)	4.30 (±1.06)	4.08 (±0.89)	4.05 (±1.29)

[1] AL: active learning, PL: passive learning, PA: passive learning with an authoritative effect. Using an unstructured scale of 5 points ranging from 1 (Completely Disagree) to 5 (Completely Agree).
[2] S: Soft approach, A: Aggressive approach
[3] Mean ratings (±standard error of the means).
[4] Mean ratings with different superscripts within the same row represent a significant difference between the educational intervention groups, by the Tukey test (P < 0.05).

There was no significant difference between the Tukey test intervention groups (p> 0.05) for most of the questions addressed, showing participants' homogeneity for the evaluated issues. Most participants from all groups agree

with the questions "There are few industrialized products with sodium reduction on the market", "Dairy products with salty taste (butter, cheese, etc.) have a sodium content above ideal"; "Foods processed with sweet taste (soft drinks, filled biscuits, etc.) have high sodium content"; "The nutritional information table is an important way to consult the amount of sodium present in processed foods"; "The list of ingredients is an important way to consult the amount of sodium present in processed foods".

There was a significant difference by the Tukey test (p <0.05) between the groups of interventions tested for the statement "The sodium content in processed foods is high" in the pre-intervention session. The opinion of the active learning intervention group was statistically different from the opinion of the passive learning and passive learning groups with an authoritative effect all with aggressive approach.

3.1.2 Behavior of the participants regarding sodium content in food in the pre-intervention session

There was no significant difference (p > 0.05) between the intervention groups for the questions: "Is the amount and / or presence of sodium important for your purchase?" and "Do you have a habit of consuming products with reduced sodium?".

When asked whether the amount and / or presence of sodium in the food is important for their purchase, of the 144 participants, 8% said to be totally important, 22% very important, 35% mean importance, 26% not important and 9% no importance.

Regarding the habit of consuming products with sodium reduction, 86% of the 144 participants don't have the habit of consuming these products. Of these, 50% said they did not get into the habit due to absence of opportunity.

This result shows the need for greater availability of products with reduced sodium in the market and also presents an opportunity for companies to launch their products at the point of sale, giving the opportunity for experimentation.

In the pre-education session, participants exhibited behavior similar to that described by Mhurchu et al. (2011), that is, the majority of participants from all groups agreed completely or partially that the sodium content in processed foods is high. Participants agreed that the amount of sodium in dairy products with salty taste (butter, cheese, etc.) and foods processed with sweet taste (soft drinks, filled biscuits, etc.) is high. Furthermore, the same majority believes that the nutritional information table is an important way to consult the amount of sodium present in processed foods and that the list of ingredients is an important way to consult the amount of sodium present in processed foods, as presented in Table 2.

3.2 Effects of educational intervention on participants' understanding and participants' perception

3.2.1 Objective and subjective understanding about the label

A RM-ANOVA revealed no significant interaction between the type of educational intervention and survey session for the objective understanding of the participants regarding the information as reduced sodium content, lower sodium content, and light, on the label [Greenhouse–Geisser correction: $F (5.915, 124.210) = 0.822, P = 0.554$].

As shown in Fig. 1, participants' objective understanding of labeling differed in relation to the three survey sessions: before, after and two weeks after the educational intervention [$F (2,42) = 62.5, P < 0.0001, \eta p2 = 0.749$]. After the educational intervention the participants showed more knowledge about the

information of the label in relation to the sodium content. "Lower sodium content" and "light" are among the participants. This trend was observed in all educational interventions ($P \leq 0.05$). Participants' knowledge of label information regarding sodium content was maintained after two weeks in all interventions ($P \leq 0.05$). However, for the groups AL S, AL A showed a decrease in knowledge about the label information regarding the sodium content after two weeks. However, knowledge about the label information in the following two weeks was even greater than in the pre-education session.

The participants' objective understanding of the information on the label did not differ in relation to the type of educational intervention [$F (5,105) = 1.417, P = 0.224$], indicating that the six means of providing information on the label with respect to sodium content are equally effective in increasing the objective understanding of the label information.

Regarding the subjective understanding of the participants regarding the label was found the interaction between the type of educational intervention and the survey session [Greenhouse–Geisser correction: $F (4.297,90.233) = 4.512, P = 0.002, \eta p^2 = 0.177$].

Participants' subjective understanding of the importance of label information for purchase did not differ in the three survey sessions [$F (2,42) = 0.302, P = 0.741$].
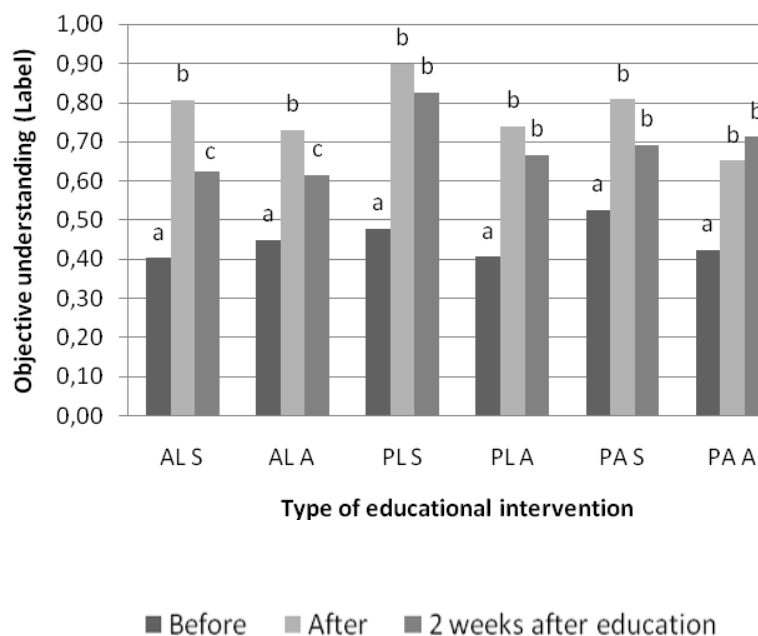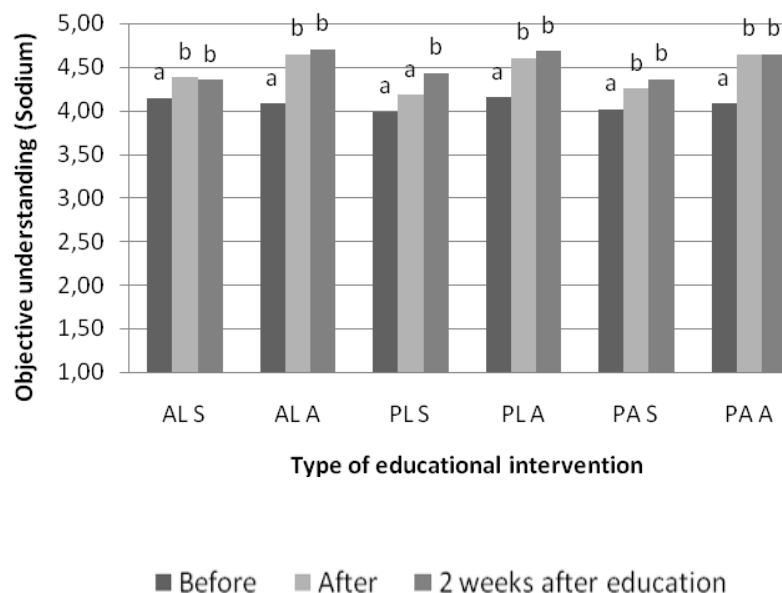
Fig. 1. Effects of the educational intervention on participants' understanding of the label of products with sodium reduction (A). There were six treatments of differing educational approaches to providing information on the label claims: AL (active learning), PL (passive learning), and PA (passive learning with an authoritative effect). Each intervention had two approach: soft and aggressive. Mean ratings with different letters within each type of educational intervention represent a significant difference between the survey sessions, by the t-test ($P < 0.05$).

Participants' subjective understanding of the importance of label information for purchase did differ in relation to the type of educational intervention [Greenhouse–Geisser correction: $F (2.118, 44.477) = 4.124$, $P = 0.021$, $\eta p^2 = 0.164$]. Participants in the group that received educational intervention of the type PL S (passive learning with a soft approach) differed statistically from those of the intervention group PL A (passive learning with an aggressive approach) in all intervention sessions: before ($p = 0.012$), ($P = 0.036$) and two weeks later ($p = 0.05$). For the other intervention groups there was no significant difference.

3.2.2 Objective understanding about the sodium

No significant interaction between education type and survey session was found for the objective understanding of the participants regarding the sodium [Greenhouse–Geisser correction: $F_{(5.568, 116.918)} = 1.328$, $P = 0.253$].

As shown in Fig. 2, participants' objective understanding of the effect of sodium on the body and the impact of excessive sodium consumption on health and the obligation of its description on the label differed in relation to the three survey sessions: before, after and Two weeks after the educational intervention [$F_{(2.42)} = 67.75$, $P < 0.0001$, p2 = 0.763]. The participants' objective understanding of sodium increased after the educational intervention. This trend was significantly ($p < 0.05$) for all interventions with aggressive approach: AL A, PL A and PA A. Probably because of the aggressive approach, more information was given regarding the impact of sodium on health and society. For the interventions with aggressive approach there was no significant decrease in knowledge after two weeks of intervention. For the educational approaches PL (passive learning) with a soft approach, there was a significant difference in the knowledge shown in the pre-education session and in the session two weeks later. However, there was no difference between the pre-education session and the session after the educational intervention.

Fig. 2. Effects of the educational intervention on participants' understanding of the sodium in food (B). There were six treatments of differing educational approaches to providing information on the label claims: AL (active learning), PL (passive learning), and PA (passive learning with an authoritative effect). Each intervention had two approach: soft and aggressive. Mean ratings with different letters within each type of educational intervention represent a significant difference between the survey sessions, by the t-test (P < 0.05).

The participants' objective understanding of the sodium did differ in relation to the type of educational intervention [F (5,105) = 2.416, P = 0.041, ηp^2 = 0.103]. There was a significant difference between the intervention groups (p = 0.008) for the session after the intervention. The intervention group PL S (passive learning with soft approach) differed statistically from the groups AL A (active learning), and PA A (passive learning with an authoritative effect), both with aggressive approach. The group PL S (passive learning with soft approach) presented less objective understanding regarding sodium when compared to the AL A and PA A groups. The other intervention groups had a significant difference, as did the sessions before and two weeks after the intervention.

3.2.3 Purchase and pay intention

The RM-ANOVA revealed significant interaction between education type and survey session for the participants regarding the purchase intention regarding the product with sodium reduction [Greenhouse-Geisser correction: F (3.899, 81.877) = 3.657, P = 0.009, ηp^2 = 0.148].

The participants' intention to buy sodium reduction products did not differ in relation to the three survey sessions: before, after and two weeks after the educational intervention [F (2,42) = 0.277, P = 0.759].

The participants' intention to buy sodium reduction products differed in relation to the type of educational intervention [Greenhouse-Geisser correction: F (1.966,41.276) = 3.327, P = 0.047, ηp^2 = 0,137]. There was a significant difference between the intervention groups (p = 0.02) for the pre-education session. The intervention groups PL (passive learning) with soft approach and aggressive approach were significantly different, being the group with aggressive approach the one that presented greater intention to buy with respect to the product with sodium reduction. Very similar result was found for the session two weeks after the intervention. The intervention group PL (passive learning) with an aggressive approach differed statistically (p = 0.02) from the PL group with a soft approach and presented a greater intention to buy compared to the product with sodium reduction. The other intervention groups did not differ significantly. For the post-intervention session there was no statistical difference for any of the groups studied.

No significant interaction between education type and survey session was found for the participants regarding the intention to pay more for a product with sodium reduction [Greenhouse-Geisser correction: F (3.794, 79.670) = 0.566, P = 0.679].

The participants' intention to pay more for a product with sodium reduction did not differ in relation to the three survey sessions: before, after and two weeks after the educational intervention [F (2,42) = 1.857, P = 0.169].

The participants' intention to pay more for a product with sodium reduction did not differ in relation to the type of educational intervention [Greenhouse-Geisser correction: F (2.302,48.349) = 1.924, P = 0.151].

3.3 Participants' perception of sodium reduction products

3.3.1 Participants' perception of sodium reduction products and health benefits

No significant interaction between education type and survey session was found for the opinion of the participants in believing that the consumption of sodium-reduced products had health benefits [Greenhouse-Geisser correction: F (2.706,56.817) = 0.877, P = 0.449].

The opinion of the participants in believing that the consumption of sodium-reduced products has health benefits did not differ in relation to the three survey sessions: before, after and two weeks after the educational intervention [Greenhouse-Geisser correction: F (1.398,29.356) = 1.537, P = 0.231].

The opinion of the participants in believing that the consumption of sodium-reduced products has health benefits did not differ in relation to the type of educational intervention [Greenhouse-Geisser correction: F (2.558,53.716) = 0.510, P = 0.648].

Of the 144 participants, 98% (141) believe that the consumption of sodium-reduced products brings health benefits. The participants already had this opinion before the educational intervention and continued with the opinion of the sessions.

3.3.2 Participants' perception of sodium reduction products and its contribution to renal insufficiency

The RM-ANOVA revealed no significant interaction between education type and survey session for the opinion of the participants in believing that the consumption of sodium-reduced products contributes to renal failure [Greenhouse-Geisser correction: $F_{(4.376, 91.892)} = 0.514$, $P = 0.741$].

The opinion of the participants in believing that the consumption of sodium-reduced products contributes to renal failure did not differ in relation to the three survey sessions: before, after and two weeks after the educational intervention [$F_{(2,42)} = 0.201$, $P = 0.819$].

The opinion of the participants in believing that the consumption of sodium-reduced products contributes to renal failure did not differ in relation to the type of educational intervention [Greenhouse-Geisser correction: $F_{(2.208, 46.375)} = 0.309$, $P = 0.757$].

44% (N = 64) of the participants believe that the consumption of products with sodium reduction contributes to renal failure. This view was maintained throughout the sessions.

3.3.3 Participants' perception of sodium reduction products and their contribution to reducing the risk of diseases

Significant interaction was found between the type of educational intervention and the opinion of the participants in believing that the consumption of products with sodium reduction helps reduce the risk of diseases such as myocardial infarction [Greenhouse-Geisser correction: $F_{(3.631, 76.256)} = 4.784$, $P = 0.002$, $\eta p^2 = 0.186$]. Only for the educational intervention passive

learning with soft approach was found significant difference (p≤0.05) in the opinion of the participants in believing that the consumption of products with sodium reduction helps reduce the risk of diseases such as myocardial infarction in relation to the time. That is, for this type of intervention in the session before the participants believed less in that statement than in the session two weeks after they believed more.

The opinion of the participants in believing that the consumption of products with sodium reduction helps reduce the risk of diseases such as myocardial infarction did not differ in relation to the three survey sessions: before, after and two weeks after the educational intervention [F (2,42) = 0.715, P = 0.495].

The opinion of the participants in believing that the consumption of products with sodium reduction helps reduce the risk of diseases such as myocardial infarction did not differ in relation to the type of educational intervention [Greenhouse-Geisser correction: F (2.546, 53.476) = 2.006, P = 0.133]. 92% of the participants believe that consumption of sodium-lowering products helps reduce the risk of diseases such as myocardial infarction. This confidence has not changed over the course of the sessions.

3.4 Efficiency of the educational intervention

Efficiency of the educational intervention in the awareness and change of attitude of the participants regarding the habit in relation to the consumption of sodium were evaluated in the soon after the educational intervention session and presented in table 3.

79.9% of the 144 participants completely agree that educational intervention is effective in improving knowledge about label information and

sodium consumption. There was no significant difference (p > 0.05) between the educational intervention groups for this question.

Most participants (79.9%) said they agree partially (41.0%) or agree totally (38.9%) that the educational intervention contributes to a change in consumption habits. 52.2% of participants in the passive learning (PL) group with soft approach said they partially agree with the above statement, differing statistically by the Tukey test (p <0.05) from the groups that received active learning (AL) with soft approach and passive learning with an authoritative effect (PA) end com aggressive approach, which agree completely.

Table 3. Comparisons of the six educational interventions with respect to their efficiency and contribution to the change of habit in relation to sodium consumption.

| | Type of educational intervention[1] | | | | | |
| | AL (group discussion) | | PL (flyer) | | PA (lecture) | |
	S[2]	A	S	A	S	A
Efficiency on the improvement of label and sodium knowledge	4.77 (±0.43)	4.86 (±0.35)	4.77 (±0.43)	4.77 (±0.87)	4.77 (±0.43)	4.64 (±0.79)
Contribution to a change in consumption habits	4.41[b] (±0.67)	4.32[ab] (±0.99)	3.55[a] (±0.96)	4.14[ab] (±1.08)	3.91[ab] (±0.92)	4.36[b] (±0.79)
Efficiency in sodium awareness	4.68 (±0.48)	4.77 (±0.53)	4.59 (±0.59)	4.82 (±0.50)	4.68 (±0.65)	4.77 (±0.53)

[1] AL: active learning, PL: passive learning, PA: passive learning with an authoritative effect.
[2] S: Soft approach, A: Aggressive approach
[3] Mean ratings (±standard error of the means).
[4] Mean ratings with different superscripts within the same row represent a significant difference between the educational intervention groups, by the Tukey test (P < 0.05).

77.1% of the 144 participants completely agree that educational intervention is effective to aware the consumer about excessive sodium intake. There was no significant difference (p≥0.05) between the educational intervention groups for this question.

4. DISCUSSION

This study demonstrated that educational intervention, regardless of type (AL, PL or PA), increased not only the participants 'objective understanding, but also the participants' understanding of the labeling of sodium-reduced products. That is, our findings showed that active and passive learning can help consumers identify products with reduced sodium by labeling and thus make them more confident in their own knowledge (Figure 1). These results suggest that providing an education intervention alone is effective enough to improve consumers' understanding of labeling products with sodium reduction. Other studies also showed that the effects of passive and active learning did not differ, as well as the aggressive and soft approach (SAMANT et al., 2016; MICHEL et al., 2009).

Educational interventions with an aggressive approach (ALA, PLA and PAA), that is, with a deeper approach to the harm and damages caused by excessive sodium intake, were more efficient in relation to the objective questions that dealt with the effect of sodium on the impact of excessive sodium intake on health and the obligation to describe it on the food label (Figure 2). The groups that underwent intervention with an aggressive approach also showed a greater intention to buy in relation to products with sodium reduction.

The subjective understanding of the importance of label information for purchase was greater for the groups that had educational intervention with an aggressive approach. The educational intervention of the type passive learning (PL) with aggressive approach was the one that obtained greater understanding. For the subjective questions it was observed that the passive intervention was more efficient than the active one. Unlike passive learning, active learning allows participants to be more exposed to comments from other participants, including negative comments and misinformation. However, compared to

passive learning, in active learning that participants are more intrinsically motivated to learn (BENWARE and DECI, 1984, HAIDET et al., 2004). Thus, through the discussion group, a participant's understanding may be affected by incorrect or confusing information from other participants (WONG, 2008, p. 256) about label information, resulting in a decrease in self-confidence.

The participants' perception in believing that the consumption of sodium-reduced products had health benefits, that it contributes to renal failure and that it reduces the risk of diseases such as myocardial infarction, did not vary significantly in terms of the types of educational interventions and Sessions. Except for the educational intervention passive learning with soft approach. For this type of intervention, there was significant difference for the session before and the session two weeks later with regard to the opinion of the participants in believing that the consumption of products with sodium reduction reduces the risk of diseases such as myocardial infarction. This result shows that most of the participants were already aware of the relationship between consumption of sodium-reduced products and health.

Based on the results of this study, we conclude that educational intervention is an efficient way to improve consumers' understanding and attitude towards excessive sodium intake and this strategy should be better used by governments and food industries. Through educational intervention, misleading consumers' inference as to misinterpretation of the meaning of information on sodium-reduced product labels can be minimized, prompting consumers to make more informed choices (GELLYNCK et al., 2006, GRUNERT, 2011, HOOGLAND et al., 2007). A well-understood label information can lead consumers to a positive and positive attitude toward that product, resulting in intent to buy (GRUNERT, 2011; HOOGLAND et al., 2007; LÄHTEENMÄKI, 2013; GRUNERT et al., 2014).

A better understanding of the sodium-reduced products label, linked to greater information about the damage caused by this "nutrient", can modify consumer behavior and may also reduce the influence of erroneous comments and information about sodium and also about the food label would generally preserve the intended purchase of these consumers.

In addition, it is important to note that in this study, awareness of the harm of excessive sodium intake was maintained for at least two weeks. That is, the effect of educational intervention on the problem of excess sodium is not temporary.

Finally, we conclude that the simple use of flyers, such as in passive learning, with information about sodium consumption and its impact on health would already be an efficient way to raise awareness among consumers. Thus, food manufacturers and especially government officials should consider disclosing information through printed or digital labels or flyers. It is also worth noting that repeated exposure to information can increase consumer understanding of label information (GRUNERT, 2011; HOOGLAND et al., 2007; LÄHTEENMÄKI, 2013).

5. CONCLUSION

The educational interventions (active learning, passive learning, and passive learning with an authoritative effect) were equally efficient for the participants' understanding of the objective questions about sodium and label. For subjective questions, which refer to participants' behavior and intention to buy, the educational intervention passive learning (reading a flyer without interference from other participants) was slightly better than the others. The aggressive approach proved to be more efficient compared to the soft approach

as the approach technique for educational intervention. That is, deeper and more realistic teachings have a better learning outcome.

In conclusion, educational intervention plays an effective role in improving consumers' understanding of the harm caused by excessive sodium intake and potentially changing consumer behavior. The use of shocking information, such as the mortality rate associated with cardiovascular diseases and the amounts spent on the treatment of these diseases, is an important tool to influence consumers to change their behavior.

The results of this study could be used to define media plans in order to achieve the consumption and consequently to make that consumer consume less sodium. In addition, the results could serve as a basis for future studies to raise consumer awareness.

This study has as limitations have studied groups with high schooling and young age. It is suggested for future studies, to study groups with different levels of schooling and of different ages.

ACKNOWLEDGMENTS

Appendix A

Characterization questionnaire

1 - What is your opinion on the issues below:

	1 - Completely agree	2 - Agree	3 - Neutral	4 - Disagree	5 - Completely disagree
The sodium content in processed foods is high					
There are few industrialized products with sodium reduction on the market.					
Dairy products with salty taste (butter, cheese, etc.) have a sodium content above ideal					
Foods processed with sweet taste (soft drinks, filled biscuits, etc.) have high sodium content					
The nutritional information table is an important way to consult the amount of sodium present in processed foods					
The list of ingredients is an important way to consult the amount of sodium present in processed foods					

Appendix A (continuation)

2 - Is the amount and / or presence of sodium (salt) in the food relevant to your purchase?

( ) Totally important ( ) Very important ( ) Average Importance ( ) Little important ( ) No important

3- Do you have a habit of consuming products with sodium reduction?

( ) Yes. Which one?_____   ( ) No

If yes, why?	If not, why?
( ) I find it tasty ( ) I believe it brings health benefits ( ) Help in improving and/or maintaining aesthetics ( ) Helps reduce disease risk ( ) Doctor's prescription ( ) Other reasons. Which are? _____	( ) I'm afraid I do not like the taste ( ) I do not believe that it brings health benefits ( ) Medical restrictions due to health problems ( ) I did not have the opportunity ( ) Lack of interest in this type of product ( ) High price ( ) Other reasons. Which are? _____

Appendix B

Research questionnaire

Objective questions

1- The claims "Pepperoni with reduced sodium content" means:

( ) Reduction of 25% in sodium content ( ) Reduction of 50% in sodium content ( ) Reduction of at least 25% in the sodium content

2 - The claims "Pepperoni with less sodium content" means:

( ) Reduction of 25% in sodium content ( ) Reduction of 50% in sodium content ( ) Reduction of at least 25% in the sodium content

3 - The claims "Pepperoni light" means:

( ) Reduction of 25% in sodium content ( ) Reduction of 50% in sodium content ( ) Reduction of at least 25% in the sodium content

4 – What is your opinion on the issues below?

	5- Totally agree	4 - Partially agree	3 - Do not agree or disagree	2 - Partially disagree	1 - Strongly disagree
Excessive sodium intake can cause cardiovascular disease.					
The recommended daily maximum consumption is 5 g of NaCl (cooking salt).					
It is mandatory to contain sodium content on food labels.					
Excessive sodium intake contributed to the occurrence of stroke.					
The main cause of death in Brazil is cardiovascular diseases.					

Appendix B (continuation)

Subjective questions

5 - Would you buy a product with sodium reduction?

( ) Would definitely buy
( ) Probably would buy
( ) Maybe bought / maybe did not buy
( ) Probably would not buy
( ) Certainly would not buy

6 - How much would you pay more for a sodium-reduced product?

( ) Would not pay anything for more
( ) Up to 20% more
( ) Up to 40% more
( ) Up to 60% more
( ) Up to 80% more
( ) Up to 100% more
( ) More than 100% more

7 - O que você acha sobre o consumo de produtos com redução de sódio? (Marque 3 alternativas)

	Yes	No
I believe it brings health benefits		
Contributes to kidney failure		
Helps reduce the risk of diseases such as heart attack		

Appendix C

Figure A. Experimental label used in educational interventions.

Appendix D

Information Flyer

Sodium is a component of sodium chloride (cooking salt). It is found naturally in food or can be added. Sodium is an essential nutrient, an insufficient intake of it can adversely affect the nervous and muscular system while excessive amounts have consequences such as increased blood pressure.

Sodium chloride is traditionally used as an additive and is added to food products to enhance flavor. It also acts as a preservative, conserving food for longer.

Sodium is reported on the label in mg (milligrams). The maximum daily intake of NaCl (salt) recommended by the World Health Organization (WHO) is 5 g per day (corresponding to 2000 mg of sodium per day).
The Brazilian average daily consumption is 12 g of NaCl (salt) per day.

For a healthier life, consume more fruits, less sodium, and exercise regularly.

If the food is less sodium, this information may or may not be described on the label. If it is, it may be in one of the following ways: **Reduced sodium content; Light; Less x% sodium; Lower sodium content.**

• Reduced sodium content: Reduction of at least 25% in sodium content in relation to the reference food.
• Light: Reduction of at least 25% in sodium content in relation to the reference food.
• Less x% sodium: Reduction of x% of sodium in relation to the reference food.
• Lower sodium content: A minimum reduction of 25% in sodium content in relation to the reference food.

Figure B. Flyer used in the soft approach.

Appendix E

Information Flyer

Sodium is a component of sodium chloride (cooking salt). It is found naturally in food or can be added. Sodium is an essential nutrient, an insufficient intake of it can adversely affect the nervous and muscular system while excessive amounts have consequences such as increased blood pressure.

Sodium is reported on the label in mg (milligrams). The maximum daily intake of NaCl (salt) recommended by the World Health Organization (WHO) is 5 g per day (2000 mg sodium per day). The Brazilian average daily consumption is 12 g of NaCl (salt) per day.

Sodium intake above the recommended maximum impairs the full functioning of the body, since the arteries (responsible for irrigation of various organs) are damaged, paving the way for a series of complications such as stroke (stroke), blindness , Renal failure, cardiovascular complications, among others.

HEALTH
Hypertension affects more than 30 million people in the country

The disease can be caused by obesity, alcohol consumption, stress, **high sodium intake**, lack of physical activity and inadequate sleep.

• Cardiovascular diseases account for 1.2 million deaths per year in the country.

• 300,000 Brazilians are victims of acute myocardial infarction per year.

• Cardiovascular diseases are the leading cause of death in Brazil.

If the food is less sodium, this information may or may not be described on the label. If it is, it may be in one of the following ways: **Reduced sodium content; Light; Less x% sodium; Lower sodium content.**

• Reduced sodium content: Reduction of at least 25% in sodium content in relation to the reference food.
• Light: Reduction of at least 25% in sodium content in relation to the reference food.
• Less x% sodium: Reduction of x% of sodium in relation to the reference food.
• Lower sodium content: A minimum reduction of 25% in sodium content in relation to the reference food.

Figure C. Flyer used in the aggressive approach.

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ARTICLE 2 BEHAVIOR OF DIFFERENT GROUPS OF CONSUMERS REGARDING LABELS FOR REDUCED SODIUM PRODUCTS

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ABSTRACT

The purpose of this study was to evaluate the factors that influence the intention to purchase products with sodium reduction, using focus group and conjoint analysis. By group of focus, information on consumer behavior was obtained and three factors were selected with three levels for the assembly of the labels to be used in the conjoint analysis: product (pepperoni, fresh cheese and parmesan cheese), claims (less 25% sodium, less sodium content and light), Label color (blue, green, red). Nine label images were created based on a fractional factorial arrangement. These images were presented to 745 consumers, who were asked to evaluate the purchase intention for each one of the images.. Participants were separated into groups using demographic data and the combined analysis was performed to allow three different comparisons. In the first comparison, participants were grouped into 4 different groups: Group 1 (Active men), Group 2 (Sedentary men), Group 3 (Active women), Group 4 (Sedentary women). Consumers were grouped into gender (male and female) in the second comparison. And in the third comparison, the participants were grouped according to the practice of physical exercises (active and sedentary). In general, the purchase was intentionally affected by the claims, product type and color of the label. The groups with the highest relative importance for the groups were formed by sedentary men, men and sedentary men. The claim "light", product "parmesan cheese" and the color "red" had a negative impact on the purchase intention for all groups evaluated. For the product factor, the one that presented the greatest positive impact was the frescal cheese, except for the group of sedentary women who evaluated this product negatively. The pepperoni product had a positive influence only for the consumer groups composed of sedentary women and the sedentary group (men and women). The most positive influence was "25% less sodium" for all groups and for the color, the most influential was the blue. The green color only had negative impact on the groups of sedentary women consumers and the sedentary group (men and women). This study may serve as a basis for food processing companies to introduce reduced sodium products labeled in a manner that satisfies the needs and desires of consumers. In addition, companies will be able to use the information in this work to launch a packaging marketing plan to increase purchase intent for low sodium products.

Keywords: conjoint analysis, purchase intent, color, claims

1. INTRODUCTION

Efforts have been made to reduce the consumption of sodium by consumers, since excessive consumption of sodium is related to a number of diseases, mainly cardiovascular problems (RAVI et al., 2016; MOZAFFARIAN et al., 2014; WONG et al., 2013; SACKS et al., 2010; STRAZZULLO et al., 2009). According to the Brazilian Health Ministry (2011), Brazilians consume an average of 4800 mg of sodium per day which is equivalent to about three times more than the 2000 mg recommended by the World Health Organization (2011).

Reduced sodium products are an alternative to reduce sodium consumption, but to do so, these products need to meet the needs of consumers and have to be recognized by consumers in the market in order to generate a positive purchase intention. Nutrition information, such as sodium content, on food labels can be an effective and economical method of communicating nutritional information, such as sodium content, to consumers (CAMPOS; DOXEY; HAMMOND, 2011). However, most often the nutritional information on food labels is complex and does not always live up to its potential for effective communication (DRICHOUTIS; NAYGA; LAZARIDIS, 2009; HIEKE; LIN; YEN, 2010; WILLS et al., 2009).

Consumers often use claims such as "low sodium, reduced sodium, diet or light" instead of nutritional information tables (LABINER-WOLFE; JORDAN LIN; VERRILL, 2010). On the other hand, claims sometimes have little impact on product evaluations (GARRETSON; BURTON, 2000) and may even be misleading and confusing (HASLER, 2008). However, claim comprehension is higher among those with greater experience and education (DEAN; LÄHTEENMÄKI; SHEPHERD, 2011; VERBEKE; SCHOLDERER; LÄHTEENMÄKI, 2009).

In addition to the claims, as "reduced in sodium", colors are used on labels as a way of differentiating traditional products from special purpose products, such as diets. There are no parameters in the legislation for this differentiation, however, studies show that light tones such as blue and light green refer to healthier products. While strong colors such as red and yellow attract the attention of consumers in search of products with high sodium, sugar or fat content (SINGH, 2006). In packaging design, color serves the functions of packaging differentiation and identification, and its semantic content makes it an essential code for the communication process (PASTOUREAU, 1993).

In this sense, studies have been developed to evaluate the effect of the attributes of the packaging as the color and sayings on the behavior of the consumer, and consequently in the choice of the product during the purchase (DELLA LUCIA et al., 2007; DI MONACO et al., 2007; HOLLEBEEK et al., 2007; RIBEIRO et al., 2008; DELLA LUCIA et al., 2009; FRATA et al., 2009). Non-sensory characteristics related to packaging as claims exert influence on the consumer's intention to purchase or choose the product (LIMA FILHO et al., 2015).

Some products have greater appeal in reducing sodium and along with the factors of the label as color and claims these factors need to be studied in order to achieve a greater intention of purchase by the consumers. An efficient way to study the labels of products with sodium reduction and products with sodium reduction in relation to the intention to purchase these products is from the group techniques of focus and conjoint analysis. Through the focus group technique it is possible to identify the main factors and levels that most influence the consumers' purchase intention and this can be confirmed with the use of the conjoint analysis technique.

Conjoint analysis is a quantitative method that has been employed in the study of the effect of packaging factors on consumer buying intention. This

technique was developed to investigate the factors that influence the purchase of a product and to estimate the importance of this influence (GREEN; SRINIVASAN, 1978), for whatever the product. In rating-based conjoint analysis, one type of conjoint analysis, consumers are asked to rate their willingness to buy of a set of individual stimulus, which enables the estimation of the relative importance of a set of product characteristics on consumers' perception at both aggregate and individual level (MOSKOWITZ et al., 2009). The conjoint analysis of factors is a powerful tool to aid in decision making in the development of new products (NATTER; FEURSTEIN, 2002). In a simplified way, the conjoint analysis of factors is the evaluation of the combination of elements of the product by the respondents, in order to understand how these elements or components of the combinations influence the response of the judges (MOSKOWITZ et al., 2004). The joint analysis of factors allows to compare the factors that influence the intention of purchase of different groups, thus enabling, a specific decision making for each group.

The objective of the present study was to evaluate the factors relative to the label that influence the intention to purchase products with sodium reduction through focus group techniques and conjoint analysis. The information acquired in this work will be useful for food companies to launch products with reduced sodium that meet the needs and desires of consumers. It is also important for policy-makers to take the necessary changes to ensure better understanding of consumer labels.

2. MATERIALS AND METHODS

The study was approved by the Research Ethics Committee under number 56679816.1.0000.5148.

2.1 Focus group

In this study, the focus group was used with the objective of defining the most important attributes related to the labeling of products with sodium reduction, general discussion of sodium consumption, and foods processed with high sodium content.

Thirty-one participants, between 20 and 60 years of age, were recruited through a questionnaire that considered the interest in participating in the research and the habit the very frequent of reading the food label. Demographic factors such as gender and frequency of physical activity were addressed in order to group the participants. In this study, participants who had a frequency of physical activity greater than or equal to three times a week were considered active and the participants with a frequency of physical activity less than three times a week were considered sedentary. Four discussion sessions were held, one with each different group. Participants were grouped into four groups: Group 1 consists of active men (physical exercise practitioners); Group 2 is formed by sedentary men; Group 3 is formed by active women; And Group 4 is formed by sedentary women. The number of participants in each group ranged from 6 to 10 participants (N = 31).

The focus group sessions lasted about an hour and were structured in three main stages: in the first stage there was a general discussion about sodium consumption. At this stage, questions were raised regarding the frequency and consumption habits, quantity of sodium in processed foods and relevant aspects

in the choice of processed products. In the second stage, ten packages of processed meat products (bacon, mortadella, salami, pepperoni, smoked sausage, ham, sausage, smoked turkey breast and hamburger) were presented and ten packages of processed dairy products (mozzarella, frescal cheese, provolone cheese, Cream cheese, cheddar cheese and prato cheese) and after the presentation of these packages, there was a thorough discussion on the subject. In the third stage, there was a discussion about the claims on the labels of products with sodium reduction. Participants discussed the more and less influential claims on purchase intent. The claims were mentioned: Reduced sodium content; Light; Lower sodium content; Less 25% sodium; And Low sodium content. Also in this stage, labels of different colors (light colors: blue, green and gray, and dark colors: red and yellow) were presented and participants discussed the influence of the colors of the labels for the identification of products with sodium reduction.

The focus group discussions were conducted by a moderator and accompanied by an observer who was present to take notes and record the sessions. From the notes and recordings the answers of all the participants were obtained regarding the sodium and packages of products processed with reduction of sodium. The data obtained through the recruitment questionnaire sessions were submitted to frequency analysis, using the SPSS program version 14.0 for windows.

2.2 Ratings-based conjoint analysis (RBCA)

2.2.1 Consumers

Seven hundred and forty-five consumers aged 18 to 78 answered an online survey to determine the influence of claims, product, label color on the

intent to purchase processed products with sodium reduction. The questionnaires were sent by email to consumers belonging to a database containing more than four thousand registered emails.

2.2.2 Label attributes and theirs levels

Through the information generated in the focus groups the attributes were identified for the labels of products processed with reduction of sodium that most influence the consumers to buy those products. Table 1 summarizes the factors and levels considered in the study.

Table 1. Attributes and levels used in the conjoint analysis design.

Attributes	Levels
Product	Pepperoni
	Fresh cheese
	Parmesan cheese
Claims	Less 25% sodium
	Less sodium content
	Light
Color	Blue
	Green
	Red

2.2.3 Experimental design and data collection

A fractional factorial design was used to generate 9 concepts (Table 2). Fractional factorial designs were chosen by minimizing the number of variables to be optimized, allowing each consumer to evaluate all labels.

Table 2. Description of the products processed with sodium reduction packages evaluated by consumers, following the experimental design.

Product	Factors		
	Product	Claims	Color
1	Pepperoni	Less 25% sodium	Blue
2	Pepperoni	Less sodium content	Green
3	Pepperoni	Light	Red
4	Frescal cheese	Less 25% sodium	Green
5	Frescal cheese	Less sodium content	Red
6	Frescal cheese	Light	Blue
7	Parmesan cheese	Less 25% sodium	Red
8	Parmesan cheese	Less sodium content	Blue
9	Parmesan cheese	Light	Green

The experimental labels were created using the Corel Draw® program (version 11.0), based on existing commercial product labels and in accordance with Brazilian food labeling standards. In Fig. 1 three examples of packaging labels produced are shown: (a) product 1, (b) product 4, and (c) product 7. An online survey was created using Google forms where each participant evaluated all nine treatments.

Fig. 1. Example of how treatments were presented in the study: (a) product 1, (b) product 4, and (c) product 7 from Appendix A.

A non-probabilistic sampling by accessibility was used, where the elements are selected for their convenience, by volunteering, or accidentally (AAKER; KUMAR; DAY, 2005). Questionnaires were sent to a database composed of professors, undergraduate and graduate students from various Brazilian universities.

Participants agreed to participate voluntarily in the survey and were instructed to imagine the purchase situation as follows: "Consider that you are shopping at a supermarket. Using the scale below, mark your purchase intention for each of the products shown.". The intention to purchase was evaluated using an unstructured 5-point scale, ranging from 1 "definitely would not buy" 5 "definitely would buy". After completing the conjoint analysis, participants were asked to answer a some questions demographic and behavioral partners.

In order to remove the effect of the display order and the residual effect on the influence of a treatment on the evaluation of the next treatment, the images were presented following an experimental design proposed by MacFie et al. (1989).

Participants were asked, through a questionnaire, whether the amount and / or presence of sodium (salt) in the food is relevant to their purchase and whether they are in the habit of consuming products with sodium reduction.

2.3 Data analysis

The data obtained through the questionnaire to evaluate the profile of the participants were submitted to frequency analysis, using the SPSS program.

The conjoint data analysis was conducted according to Green and Srinivasan (1978). The results of the conjoint analysis were statistically analyzed using the Statistical Analysis System (SAS) software (SAS Institute, Inc., Cary, NC, USA).

To assess how the factor levels combine to form a score describing the intent to purchase, an additive model was adopted as the composition rule (Eq. (1)).

$$Y = \sum_{i=1}^{n} \sum_{j=1}^{m} v_{ij} X_{ij} \qquad (1)$$

where Y is the overall assessment of the consumer (intent to purchase) for the label; v_{ij} is the part-worth unknown (estimated in conjoint analysis), on the *jth* level of the ith factor ($i = 1, 2, \ldots n$ and $j = 1, 2, \ldots m$); X_{ij} is the indicator variable of the presence of the *jth* level of the *ith* factor in the product ($X_{ij}=0$ or $X_{ij}=1$). A multiple linear regression statistical model with dummy variables was used to calculate the partworths with the least squares method.

The results of the participants' profiles were grouped to allow three different comparisons. In the first comparison, participants were grouped into 4 different groups: Group 1 (Active men), Group 2 (Sedentary men), Group 3 (Active women), and Group 4 (Sedentary women). Consumers were grouped into gender (male and female) in the second comparison. And in the third comparison, the participants were grouped according to the practice of physical exercises (active and sedentary), regardless of gender. An aggregate conjoint analysis was performed for each group, previously described (active men, sedentary men, active women, and sedentary women), indicating the partworths at the levels of each factor and the relative importance (RI) of those factors in each group (GREEN; SRINIVASAN, 1978; CARNEIRO et al., 2005).

3. RESULTS

3.1 Focus groups

During the recruitment stage, all recruited participants said they read the food labels. As for the importance of the label's words for purchase, the women's group, regular exercise practitioners said in the majority be very important, the group of men, physical exercise practitioners regularly said to be totally important to the majority, to the group of most sedentary women said medium importance and totally important sedentary men. We understand for this work that active subjects are those who practice physical exercises at least three a week. Except that they are sedentary. All participants from the four groups answered that they did not have (or had) any disease such as hypertension, diabetes mellitus, hypercholesterolemia, stroke and / or cardiovascular disease.

A script was drawn up and followed to learn participants' views and behaviors regarding sodium in processed foods, consumer and health habits, processed and non-reduced sodium product labels, color and claims of processed product labels, and Purchase intention for products with sodium reduction.

Most participants, from all four groups, believe that the amount of sodium in processed foods is high. When asked if the amount of sodium ingested is important to them, groups of active men and active women said yes, while groups of sedentary men and sedentary women said they did not care about how much sodium they ingested. Of the four groups, the only one who has a habit of buying products with sodium reduction is the active men group. Concerning concern for food, only groups of active men and women said they were worried.

Most of the participants cited as processed products that should have their sodium content reduced to parmesan cheese and pepperone. Frescal cheese was the least cited as a processed product having its reduced sodium content.

Female participants (active and sedentary) responded that they would certainly buy dairy and meat products in the reduced sodium content while male (active and sedentary) participants said they would likely buy.

When asked if these products, in the reduced sodium content cost 25% more than the traditional ones they would buy; The active women said they would probably buy it, active men and sedentary women responded that they might buy / maybe not buy and the sedentary men said mostly that they probably would not buy.

As for the clarity of the information that it is a product with reduced sodium content, most participants, from all groups, said that the words "Less 25% sodium" and "Reduced sodium content" are the understandable. And that the saying "light" is the least understandable.

Most participants, from all groups, said that the color of the packaging / label can influence the purchase of processed products with reduced sodium. They also said that light colors such as blue and green are the ones that most refers to light products, reduced or with a lower sodium content; And that the red color is that less refers to these products.

Thus, the factors that most influence the intention to purchase products with sodium reduction are product, claims and color of the label. For each factor were defined three more influential levels, they are pepperoni, parmesan cheese and frescal cheese for product, lower sodium content, less 25% of sodium and light for claims and blue, green and red for the color of the labels.

3.2. Ratings-based conjoint analysis (RBCA)

3.2.1 Profile of the participants

The profile of the 745 consumers who participated in this study is shown in Table 2. The results were presented by groups, with group 1 consisting of active men, group 2 formed by sedentary men, group 3 formed by active women, and group 4 formed by sedentary women.

Group 1 is composed of 173 participants (23%). Of these, 70.5% are between 18 and 39 years of age. The majority of this group is single (54.9%) and 37% are married, the rest are divorced or live with their partner. Family income ranged from 1 to 2 minimum wages to 18.5% of participants, 2 to 5 to 33.5%, 5 to 10 to 24.3%, 10 to 20 to 18.5% and 4.6% to 20% Minimum wages. The participants without income were 0.6%. Regarding the educational level of group 1, 61.3% of the participants had university education or had a postgraduate diploma. 64.2% of participants said sodium content is relevant to the purchase of processed products. A little more than half of the participants (54.9%) reported not having the habit of consuming processed products with sodium reduction.

Group 2, with only 13% of participants (N = 100), is composed of sedentary men. Most of this group is between 18 and 39 years old (74%). 41% of group 2 are single and 39% are married, the rest are divorced (9%) or live with their partner (11%). The family income of group 2 varied from more than two to ten minimum wages for the majority (70%). The majority of participants in group 2 (65%) are university graduates or have a postgraduate diploma. The sodium content is relevant for the purchase of processed products for half of the participants (51%) and most of them (75%) are not in the habit of consuming products processed with sodium reduction.

Group 3, comprised of active women, held the majority of participants in this study (38%). The majority (53.2%) had between 18 and 29 years and 27% had 30 to 39 years of age. The remainder (19.2%) is 40 to 69 years old. The majority of this group is single (57.4%) and 31.6% are married, the remainder (11%) are divorced or live with their partner. Family income ranged from 1 to 2 minimum wages to 15.2% of participants, 2 to 5 to 35.5%, 5 to 10 to 26.6%, 10 to 20 to 15.2%, 4.3% to 20% Minimum wages and 3.2 have no income. Group 3 had the majority of the participants with post-graduation (61.3%). For most participants (73.4%), the sodium content is relevant for the purchase of processed products. However, only slightly more than half (58.9%) have a habit of consuming processed products with sodium reduction.

Group 4, formed by sedentary women, is composed of 190 participants (26%). Half of this group (50.5%) is between 18 and 29 years of age, 30.5% are between 30 and 39 years of age and the remainder (19%) are over 40 years of age. The majority (58.4%) of group 4 is single and 27.4% are married, the remainder is divorced (5.3%) or lives with their partner (8.9%). The family income of group 4 ranged from more than two to ten minimum wages for the majority (61.6%). Most of the participants in this group (62.1%) have a university degree or have a postgraduate diploma. Most of the participants (58.9) did not find the sodium content relevant to the purchase of processed products and the majority also (58.4%) did not have the habit of consuming processed products with sodium reduction.

Table 3. Profile of the participants in the conjoint analysis, expressed as a percentage (N = 745).

Profile of the participants		Male (37%)		Female (63%)	
		Active (23%)	Sedentary (13%)	Active (38%)	Sedentary (26%)
Age (years)	18–29 years	42.2	35.0	53.2	50.5
	30–39	28.3	39.0	27.0	30.5
	40–49	11.0	15.0	8.2	8.4
	50–59	9.2	7.0	7.8	6.3
	60–69	9.2	4.0	3.9	4.2
Marital status	Single	54.9	41.0	57.4	58.4
	Married	37.0	39.0	31.6	27.4
	Divorced / separated	2.3	9.0	6.4	5.3
	Living with partner	5.8	11.0	4.6	8.9
Monthly household income level	Up to a minimum wage (< R$837)	8.7	6.0	2.8	6.8
	More than one to two minimum wages (R$837 to R$1,674)	9.8	13.0	12.4	15.8
	More than two to three minimum wages (R$1,674 to R$2,511)	17.3	17.0	17.4	21.6
	More than three to five minimum wages (R$2,511 to R$4,185)	16.2	14.0	18.1	23.2
	More than five to ten minimum wages (R$4,185 to R$8,370)	24.3	26.0	26.6	16.8
	More than ten to twenty minimum wages (R$8,370 to R$12,555)	18.5	20.0	15.2	11.6
	Above 20 minimum wages (> R$16,740)	4.6	3.0	4.3	1.1
	No income	0.6	1.0	3.2	3.2
Education level	Incomplete elementary education	0.6	0.0	0	0.5
	Complete elementary education	0.0	3.0	0.7	1.6
	Incomplete secondary education	4.6	7.0	1.8	3.2
	Complete secondary education	13.9	9.0	3.5	7.4
	Incomplete higher education	19.7	16.0	15.6	25.3
	Complete higher education	8.1	11.0	17.0	15.8
	Graduate	53.2	54.0	61.3	46.3
Relevance of sodium for purchase	Yes	64.2	51.0	73.4	58.9
	No	35.8	49.0	26.6	41.1
Consumes products with sodium reduction	Yes	45.1	25.0	58.9	41.6
	No	54.9	75.0	41.1	58.4

3.2.2. Influence of labeling factors of products with sodium reduction for different consumer groups

The results were grouped to allow three different comparisons. In the first comparison, participants were grouped into 4 different groups: Group 1 (Active men), Group 2 (Sedentary men), Group 3 (Active women), Group 4 (Sedentary women). Consumers were grouped into gender (male and female) in the second comparison. And in the third comparison, the participants were grouped according to the practice of physical exercises (active and sedentary). Aggregate analyzes for the first, second and third comparisons are shown in Tables 3, 4 and 5, respectively.

Table 3 shows the results of the aggregate analysis for each consumer group of the first comparison. The type of claims, product and color of the label, in decreasing order of relative importance, significantly affected ($p \leq 0.01$) the purchase intention of consumers of all groups, in the first comparison. Except for group 2 (sedentary men), which were significantly affected by the claims (RI = 61.2%) and equally affected by the product (RI = 19.4%) and color (RI = 19.4%). For claims, the "light" claim had a smaller impact on the purchase intention for all groups. And the claim "25% less sodium" was the one most positively influenced the purchase of all groups. The claim "lower sodium content" also had a positive influence on consumers. The colors blue and green made a positive impact in all groups, being the color blue the color with greater impact. The red color obtained negative inflence for all four groups. All groups were impacted by the product, however, they differed in relation to the type of product. For group 1 (active men), group 3 (active women), and group 4 (sedentary women), only fresh cheese had a positive influence on consumer purchase intentions, while pepperoni and parmesan cheese products had a negative influence on the purchase intentions. In the case of group 2 (sedentary

men), the product that influenced positively the intention of purchase of these consumers was pepperoni.

Table 4. Aggregate analysis results for groups of consumers of active men (group 1), sedentary men (group 2), active women (goup 3), and sedentary women (group 4).

	Group 1 (N = 173)	Group 2 (N = 100)	Group 3 (N = 282)	Group 4 (N = 190)
% of total consumers	23 %	13 %	38 %	26 %
Attributes and levels/relative importance	Part-worths			
Product				
Pepperoni	-0.1053 a	0.1200 c	-0.1324 a	-0.0070 b
Frescal cheese	0.1933 c	-0.0767 a	0.2541 c	0.1667 c
Parmesan cheese	-0.0880 b	-0.0433 b	-0.1217 b	-0.1596 a
Relative importance	**32.8** %	**19.4** %	**39.3** %	**34.8** %
Claims				
Light	-0.3231 a	-0.3400 a	-0.3345 a	-0.3333 a
Lower sodium content	0.1297 b	0.0567 b	0.1253 b	0.1298 b
25% less sodium	0.1933 c	0.2833 c	0.2092 c	0.2035 c
Relative importance	**56.6** %	**61.2** %	**55.4** %	**57.3** %
Color				
Blue	0.0353 c	0.0867 c	0.0165 b	0.0421 c
Green	0.0257 b	0.0233 b	0.0177 c	-0.0316 a
Red	-0.0610 a	-0.1100 a	-0.0343 a	-0.0105 b
Relative importance	**10.6** %	**19.4** %	**5.3** %	**7.9** %

Different letters in the same column for the same attribute and group denote a significant difference ($p \leq 0.05$) by the Tukey test. The negative signals mean negative impact on consumer intention to purchase.
Group 1: Active men (Exercise three or more times a week); Group 2: Sedentary men; Group 3: Active women; Group 4: Sedentary women.

For group 1, 23% of the consumers, the decreasing order of the relative importance (RI) of the factors studied were claims (56.6%), products (32.8%) and colors (10.6%). That is, group 1, formed by male consumers and active in relation to physical activity, considered the label claims to be more important in

relation to the intention to purchase products with sodium reduction. For this group, the products have a moderate importance and the color of the labels is of smaller importance. Frescal cheese was the only product that positively influenced the purchase intention of these consumers. The claims "25% less sodium" and "lower sodium content" were the most influential claims for the positive intention to buy, the first claim being of greater intention. The color blue was more influential than the color green, the two colors being influential in the purchase intention for these consumers.

Group 2, consisted of sedentary men, which accounts for 13% of the participants, the product and the color of the label have the same importance (RI = 19.4%) for the intention of purchase of these consumers. While the claims (RI = 61.2%) have greater influence for them. This group was the only one that pepperoni was preferred over the intention to purchase. The blue and green labels had greater influence on the purchase intention. The claim "25% less sodium" was the one that had the greatest positive influence on the intention to buy for this group of sedentary men.

Group 3, composed of active women, with 38% of the consumers, showed a greater relative importance (RI = 55.4%) for the claims, and the color of the label influenced less (RI = 5.3%) the intention to purchase. For this group, the pepperoni and parmesan cheese products had a negative influence on the intention to buy, while the product frescal cheese was the only one with a positive intention to buy. The most influential claim was the "25% less sodium", with a positive influence on the purchase intent. The colors of the blue and green label had a positive influence on the intention to buy and the color red negatively influenced the purchase of these consumers.

Group 4, formed by sedentary women, represented 26% of the participants, was more affected by the claims (RI = 57.3%) and product (RI = 34.8%). The color of the labels (RI = 7.9%) influenced this group of consumers

less. The claims "25% less sodium" had higher part-worths, that is, these are the best claims for the reduced sodium product label. The product and the color that most influenced positively the intention of purchase of these consumers was the cheese frescal and the blue color.

Table 4 shows the results of the aggregated analysis for the second comparison, where consumers were divided into two groups in relation to gender. Group 1 is formed by men and group 2 by women.

Table 5. Aggregate analysis results for groups of consumers of women (group 1) and men (group 2).

	Group 1: women (N = 472)	Group 2: men (N = 273)
% of total consumers	64 %	36 %
Attributes and levels/relative importance	Part-worths	
Product		
Pepperoni	-0.0018 b	-0.0228 b
Frescal cheese	0.2189 c	0.0944 c
Parmesan cheese	-0.1370 a	-0.0716 a
Relative importance	**37.5** %	**19.4** %
Claims		
Light	-0.3340 a	-0.3293 a
Lower sodium content	0.1271 b	0.1030 b
25% less sodium	0.2069 c	0.2263 c
Relative importance	**57.0** %	**65.0** %
Color		
Blue	0.0268 c	0.0541 c
Green	-0.0021 b	0.0248 b
Red	-0.0247 a	-0.0790 a
Relative importance	**5.5** %	**15.6** %

Different letters in the same column for the same attribute and group denote a significant difference ($p \leq 0.05$) by the Tukey test. The negative signals mean negative impact on consumer intention to purchase. Group 1: Women; Group 2: Men.

Women and men had a similar intention to purchase behavior for the claims and product attribute. For both groups, it obtained greater relative importance (RI) and the claims "25% less sodium" and "light" were the ones that impacted in a positive and negative way, respectively, the intention of purchase of these consumers. The claim "lower sodium content" also had a positive impact on both groups. Both male consumers and female consumers were positively influenced only by the frescal cheese product. The color was of lesser relative importance for group 1 (RI = 5.5%) and group 2 (RI = 15.6%), and for group 1 the only color of positive influence was blue and for group 2, The blue one was the one with the greatest positive influence, but the green color also positively influenced this group. Both groups considered the red color to be of influential negative for the purchase of products with reduction of sodium.

Table 5 shows the results of aggregate analysis for consumers divided into two groups in relation to the practice of physical exercises. Group 1 (Exercise three or more times a week); Group 2: Sedentary (Exercise less than three times per week).

In this comparison, active and sedentary consumer groups had their intention to purchase significantly affected (p≤0.01) by type of claims, product and color of the label, in decreasing order of relative importance. Both active consumers and sedentary consumers were positively affected by the "25% less sodium" and "lower sodium content" claims, the first being the most influential in relation to the purchase intention. The "light" claim negatively influenced the purchase intent for these groups. For the active consumers, only the frescal cheese product had a positive influence on the purchase intention, while for the sedentary consumers, the pepperoni and fresh cheese products were those that positively influenced these groups. The parmesan cheese product negatively influenced all two groups. The color of the blue label was of positive influence and the color red of negative influence for the intention of purchase of the active

and sedentary consumers. Green color positively influenced the purchase of group 1 consumers only.

Table 6. Aggregate analysis results for groups of consumers of active (group 1) and sedentary (group 2).

	Group 1: active (N = 455)	Group 2: sedentary (N = 290)
% of total consumers	61 %	39 %
Attributes and levels/relative importance	Part-worths	
Product		
Pepperoni	-0.0714 b	0.0368 b
Frescal cheese	0.1961 c	0.0828 c
Parmesan cheese	-0.1247 a	-0.1195 a
Relative importance	**34.3** %	**23.2** %
Claims		
Light	-0.3292 a	-0.3356 a
Lower sodium content	0.1201 b	0.1046 b
25% less sodium	0.2091 c	0.2310 c
Relative importance	**57.5** %	**65.0** %
Color		
Blue	0.0357 c	0.0575 c
Green	0.0056 b	-0.0126 b
Red	-0.0413 a	-0.0448 a
Relative importance	**8.2** %	**11.8** %

Different letters in the same column for the same attribute and group denote a significant difference ($p \leq 0.05$) by the Tukey test. The negative signals mean negative impact on consumer intention to purchase.
Group 1: Active (Exercise three or more times a week); Group 2: Sedentary (Exercise less than three times per week).

4. DISCUSSION

Better understanding how consumers perceive foods with sodium reduction would help shape policies for launching and disseminating these products. The present study showed, through the conjoint analysis, that the claims of the labels of products with reduction of sodium have great importance for the intention of purchase of the consumers. According to Drewnowski et al. (2010), the conjoint analysis can lead to a better understanding of how consumers behave in relation to nutritional information, such as sodium content, of a product and is a powerful tool for testing nutrient content claims. Carneiro et al. (2005) verified that nutritional claims in labels have an impact on the intention to purchase soybean oil. The conjoint analysis was used by Della Lucia et al., 2010 to evaluate the influence of some strawberry flavor yogurt labeling factors on purchase intention and verified that this analysis is efficient in tests that involve the influence of non-sensorial characteristics of the product in relation to consumer assessment.

The consumer groups analyzed did not differ significantly in terms of average age, marital status, monthly household income level, and education level. The relative importance for the claims were higher for all groups analyzed. The claim "25% less sodium" presented higher part-worths for all consumer groups. Thus, for all three comparisons, this is the best way to inform the label that this is a sodium-reduced product. The claim "Lower sodium content" also presented positive part-worths for all groups, however, lower statistically (p <0.05) than the claim "25% less sodium". This result is in agreement with Wong (2013), who demonstrated that consumers prefer easier to understand claims. For all groups, the "light" claim obtained negative values, which means that the claim has less influence on the purchase intention for a product with sodium reduction. Bower et al. (2003) have shown in a study with a spreading fat with a

proven health benefit that the health claims on the label affected consumers' intention to purchase these products.

Studies show that health-related claims result in higher purchase intent in individuals living with a risk factor or disease (DEAN et al., 2012; MCLEAN, HOEK; HEDDERLEY, 2012). Participants in this study stated that they did not have any type of illness related to excessive sodium intake.

The product has a moderate importance for the intention of purchase of the consumers. There was a difference between the groups for the purchase intention in relation to the product factor. That is, the profile of consumers affects the purchase of products with sodium reduction. Women (active and sedentary) and active men prefer the product "Frescal cheese". While groups of sedentary consumers of both genders and the group of male sedimentary prefer pepperoni. Consumers considered to be sedentary are those who consume less sodium-reduced products (Table 2). According to Ares and Gámbaro, 2007, in a study of the effect of different carriers and enrichments on the perceived healthiness and willingness to try functional foods, gender has influence on consumer preference patterns.

Color had less influence on the intention to buy for most groups. The blue and green ones being the ones with the highest purchase intentions. The red color presented worse intention of purchase. Similar results were found by Vasiljevic, Pechey & Marteau (2015), in their study, they reported that using green labels to denote healthier foods, and red to denote less healthy foods increases consumption of green- and decreases consumption of red-labeled foods. The green color obtained greater intention to buy in a study with packaging of minimally processed products (DANTAS et al., 2004).

Labels for products with sodium reduction that are easier to understand should be developed by manufacturers and regulatory bodies (SOUIDEN et al., 2013). In addition to choosing a product with a potential reduced sodium value,

consumers should be able to understand the labels and be attracted to buying the product, whether by claims or color.

5. CONCLUSION

Through the focus group it was possible to identify the facts and levels that most influence the purchase intention and the joint analysis allowed the quantification of these factors and levels. In general, the purchase was intentionally affected by the claims, product type and color of the label. The claim that most influenced consumers' purchasing intentions was "25% less sodium" for all groups and for color, the most influential was blue. The product that presented the greatest positive impact for most of the groups was the Frescal cheese, with the exception of the group of sedentary women who evaluated this product negatively. The claim "light", product "Parmesan cheese" and the "red" color had a minor impact on the intention to buy for all groups evaluated.

This study may serve as a basis for food processing companies to introduce reduced sodium products labeled in a manner that satisfies the needs and desires of consumers. In addition, companies will be able to use the information in this work to launch a packaging marketing plan to increase purchase intent for low sodium products.

Limitations of the current study are in the consumer groups having the same demographic characteristics, thus being representative only for that particular niche market. Another limitation is that the chosen group does not represent the demographic profile of the majority of the Brazilian consumers residing in the study region. We suggest future studies with different groups, from different regions and social classes.

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